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A FACTORIAL ECOLOGY OF MALMÖ 1965

THE SOCIAL GEOGRAPHY OF A CITY

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PREFACE

Research of this type has been accomplished and discussed numerously for several years in the academic world. This dissertation deals with the quantitative technique for very objectively mapping out substandard areas in a city, in the sense that the author was not influenced by subjective perception of the city. One can, of course, criticize the selection of variables which affect the final results. There are many deficiencies in such a study, but, in spite of these, one gets a picture of the physical and social structure of the city. Perspectives for more successful planning for future development can be inferred.

Chapter I introduces the problem and offers the objectives and hypotheses. Chapter II examines the theoretical and empirical background for the research. Chapter III presents the historical background and physical development of the city and describes the population. In Chapter IV, under analytical procedures, the variables are identified, factor analysis is discussed, and some problems of the procedure in connection with spatial data are given.

Chapter V analyses the structure of the factors, and Chapter VI evaluates the analysis. Chapter VII takes into consideration the spatial aspect of residential differentiation by discussing the classic spatial theories and by giving the components which cause residential differentiation. Finally, Chapter VIII reflects upon the results of the research.

I would like to express my deepest appreciation for the inspiration and encouragement I have received from my colleagues and all the personnel at the Geography Institution. Professor Olof Nordström has been very instrumental for my success because of his wise criticism, advice, and encouragement. He has counseled me during the last six years. Thanks to Professors Peter Gould, who put me on the right path, and Allan Pred, who critically read my manuscript and



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gave many necessary words of wisdom. Jean Forbes and Bo Lenntorp rendered positive and thought provoking criticisms. Tommy Book was my Malmö expert, and Zoltan Petery and Naiduayah Naidu were extremely inspirational. Rezső Laszlo did the superb technical photographic work, and my good friend Valdemar Wentz provided me with the excellent photographs of Malmö. I also take this opportunity to give thanks to the group of students who performed the interview survey.

DeWitt Davis, Jr.

Lund, Summer 1972

TABLE OF CONTENTS

PREFACE.....	Page ii
LIST OF TABLES.....	vi
LIST OF ILLUSTRATIONS.....	vii
 Chapter	
I. INTRODUCTION.....	1
Statement of Problem	
Framework of the Study	
Objectives and Hypotheses	
 II. THEORETICAL AND EMPIRICAL BACKGROUND.....	 5
Conceptual Framework	
Empirical Studies	
 III. THE CITY OF MALMÖ.....	 10
Introduction	
Development to 1965	
Characteristics of the Population Studied 1965	
Change of Population	
Distribution of Age	
Labor Force	
Conclusion	
 IV. ANALYTICAL PROCEDURES.....	 20
The Variables	
Factor Analysis	
Output of Program	
Definition of Terms	
General Problems of Spatial Data	
 V. CLASSIFICATION OF FACTORIAL ECOLOGY.....	 35
Introduction	
Factor Structure	
Factor 1: Family Status	
Factor 2: Socioeconomic Status	
Factor 3: Housing	
Factor 4: Young Familism	
Factor 5: Blue Collar Employment	
 VI. EVALUATION OF THE ANALYSIS.....	 52
Detailed Analysis of Substandard One	

Chapter	Page
Detailed Analysis of Substandard Two	
Detailed Analysis of the Potential Zone	
VII. THE SPATIAL ASPECT OF RESIDENTIAL DIFFERENTIATION.....	82
The Classic Ecological Theories	
The Concentric Zonal Model and Malmö	
The Sector Model and Malmö	
The Multiple-Nuclei Theory	
Criticisms of the Zonal and Sector Theories	
The Spatial Structure of Residential Malmö	
The Foundation for Differentiation of Residential Areas	
Economic and Social Components	
VIII. CONCLUSION.....	111
Appendices	
A. COMPLETE OUTPUT (EXCEPT FACTOR SCORES) FROM THE FACTOR	
ANALYSIS OF 1965 DATA.....	118
B. FACTOR SCORES FROM THE FACTOR ANALYSIS OF 1965 DATA.....	120
SELECTED BIBLIOGRAPHY.....	129

LIST OF TABLES

Table	Page
1. Population at the End of Each Year.....	15
2. Age of Population 1965.....	19
3. Labor Force Population 1965.....	19
4. List of Variables Used in the Analysis.....	23-25
5. Census Tracts in Malmö City 1965.....	29-31
6. Census Tracts Used in the Analysis.....	32
7. Per Cent of Total Variance Explained for Each Factor.....	36
8. Communality of Each Variable for Five Factors.....	36
9. Factor 1: Family Status.....	37
10. Factor 2: Socioeconomic Status.....	41
11. Factor 3: Housing.....	44
12. Factor 4: Young Familism.....	47
13. Factor 5: Blue Collar Employment.....	49
14. Per Cent of Variables in SS1 Census Tracts.....	64
15. Comparison of the SSA Stages for the Variables in Per Cent.....	113
16. Factorial Ecology of City of Malmö: 1965 Factor Loadings...	118-19
17. Factor Scores for Census Tracts.....	121-28

LIST OF ILLUSTRATIONS

Figure	Page
1. Urban Ecological Spatial Model.....	6
2. The City of Malmö: Location Map.....	11
3. The Growth of Malmö City: 1862-1922.....	13
4. The Growth of Malmö City: 1942-1962.....	14
5. Population Distribution in the City of Malmö, 1965.....	16
6. Population Increase and Decrease.....	17
7. The Census Tracts in Malmö City: 1965.....	28
8. Family Status: 1965.....	39
9. Socioeconomic Status: 1965.....	43
10. Housing: 1965.....	46
11. Young Familism: 1965.....	48
12. Blue Collar Employment.....	50
13. Urban Ecological Spatial Model.....	52
14. Substandard One Census Tracts.....	54
15. Substandard Two Census Tracts.....	56
16. Potential Zone Census Tracts.....	58
17. Census Tracts for Three Stages of SSA.....	60
18. Two-Dimensional Social Space Graph with Family Status and Socioeconomic Status.....	62
19. Land Clearance Photo of SS1 Area 384 in Södervärn in 1971.....	69
20. Land Clearance Photo of SS1 Area 302 in Rörslöjstaden in 1971.....	69
21. SS1 Area Census Tract 576 in the Limhamn District in 1971.....	71

Figure	Page
22. Census Tracts with Great Percentage for above Variables....	73
23. Census Tracts with Great Percentage for above Variables....	73
24. Land Clearance Photo of SS2 Area Census Tract 305 in the Södra Förstaden District in 1971.....	75
25. SS2 Area Census Tract 810 in Persborg a Sub-District of Rosengård in 1971.....	75
26. Census Tracts with Great Percentage for above Variables....	76
27. SS2 Area Census Tract 820 in Segevång a Sub-District in Östra Förstaden District in 1971.....	76
28. Land Clearance Photo of a P-zone Area Census Tract 100 in the Gamla Staden District in 1971.....	79
29. P-zone Area Census Tract 621 in Lorensborg a Sub-District in the Pildammsstaden District in 1971.....	79
30. P-zone Census Tract 800 in Rosengård District in 1971.....	80
31. Concentric Zones in Malmö.....	85
32. Sectors in Malmö.....	89
33. Land Use Map of Malmö City: 1965.....	90
34. Location Map.....	100
35. Residential Desirability for Kirseberg School Children.....	101
36. Residential Desirability for Adults in Kirseberg School Area.....	101
37. Residential Desirability for Rörsjö School Children.....	102
38. Residential Desirability for Adults in Rörsjö School Area.....	102
39. Residential Desirability for Södervärn School Children.....	104
40. Residential Desirability for Adults in Södervärn School Area.....	104
41. Residential Desirability for Kronborg School Children.....	105
42. Residential Desirability for Adults in Kronborg School Area.....	105
43. Residential Desirability for Hermodsdal School Children.....	107

Figure	Page
44. Residential Desirability for Adults in Hermodsdal School Area.....	107
45. Residential Desirability for Värner Rydén School Children.....	108
46. Residential Desirability for Adults in Värner Rydén School Area.....	108

CHAPTER I

INTRODUCTION

Statement of the Problem

Sociology, geography, economics, and political science are the wide range of disciplines that have, in the past, dealt and are presently dealing with the problems of describing the socio-economic pattern of urban populations and their spatial distribution in the area. In the case of this study there may be some critical discussion as to the use of interdisciplinary procedures. The author would like to emphasize this necessity with the help of Haggett and Chorley. "If the geographer is not to admit complete defeat in accounting for the residential pattern, he must try to understand the sociologist's model of social stratification for the appropriate society, together with a knowledge of the values, in particular the aspirations for certain life styles of major subgroups of the population; this as was pointed out by Gans, will lead the geographer to the larger social, economic and political systems."¹ There have been many studies performed with variations of the socioeconomic structure. Particular attention has been given to identifying the kinds of change taking place in the urban ecological system.² None of these studies, to the author's knowledge, have dealt with the very special problems of elucidating the relevance of quantitative methods in discovering areas and potential areas of substandard conditions.

It is the intention of this study to treat this very specific problem in a more scientific way with the expectation of using sufficient technical tools. The concept, factorial ecology, is a combination of the terms human ecology, created by "the 1920 Chi-

¹R. J. Chorley and P. Haggett, Models in Geography, (London); 1967, pp. 220-240.

²See Brian J. L. Berry, "Cities as systems within Systems of Cities," in John Friedmann and William Alonso (eds.), Regional Development and Planning (Cambridge: MIT Press, 1964), pp. 116-37.

cago school," and factor analysis when utilized for areal differentiation purposes.

The City of Malmö was selected for the study because the city has a very efficient system for collecting data, and the civic departments and officials are positive to contributing to academic research. The city is the third largest in Sweden with a population of approximately one fourth of a million in 1965. This is a sizeable population entwined in a spatial area which has all the necessary characteristics to create the intricate problems confronted by especially all large and middle-sized cities of the world, even though there is assumed more homogeneity in populations in Swedish cities than other cities of the world. This is the main trend of thought, in this study, for not treating the ethnic status that previous and present studies have done and are doing. Immigrant groups are small in number and are not restricted to ethnic ghettos as in other cities of the world.

Framework of the Study

In order to study the socioeconomic characteristics of the residential areas and their patterns, it is necessary to build a frame of reference. Studies of residential pattern have been divided into three broad methodological types: Cartographic and spatial pattern, social area analysis (in the broad sense), and segregation index studies.³ In the first methodology, empirical works were done by Burgess (1925), Hoyt (1939), Harris and Ullman (1945), Sweetser (1968), and others.

Social area analysis, which will be specially treated later, can be divided into two subdivisions: Social Area Analysis and Factorial Ecology. Under social area analysis are found works by Shevky and Williams (1949) who built the foundation to Social Area Analysis methodology, Shevky and Bell (1955), Herbert (1967), and others. Because of the unreliability of that methodology, Factorial ecology replaced it with studies by Bell (1955), Van Arsdol (1957), Sweetser (1965), Abu-Lughod (1968), Berry and Rees (1969), and others. These above mentioned studies encompass individual city studies, reviews and syntheses of individual city studies, and set

³Philip H. Rees, "Residential Patterns in American Cities," (unpublished paper, University of Chicago, 1969).

of cities.

This research deals with an individual city over one census year. Segregation index studies is the third methodology used in studies by Duncan and Duncan (1955), Lieberman (1963), and Taeuber and Taeuber (1965). Each of these methodologies is a solution to the problem of analyzing the pattern in the basic data matrix of social and environmental information concerning a city's residential areas.⁴ Consequently, attempting to derive substandard areas as an end result, this study will eventually consider the first two of the most described models of spatial distribution: zonal model and sector model. It will also treat the subject of residential differentiation.

Objectives and Hypotheses

"Population has always figured prominently in geography. Consideration of the distribution and density of population has been a starting point in many geographical studies, a finishing point in others, and has occasionally played both roles when the purpose of the study was to bring a new understanding of some aspects of distribution patterns."⁵ The character of a city is affected when the population grows pass certain limits.⁶

The point of departure of this research is three basic aims. Firstly, it is intended to illuminate or bring to bear the internal residential structure or pattern of Malmö. This should be achieved by utilizing the basic characteristics generally used in urban ecological studies of this type. The complexities of urban patterns and populations within the subareas (census tracts) are intended to be elucidated in this study.

Secondly, quantitative methodology will be utilized in order to determine if the method is applicable and useful in discovering substandard areas and other areas with potential of becoming sub-

⁴Ibid.

⁵See E. A. Wrigley, "Geography and Population," in R. J. Chorley and P. Haggett (eds.), In Frontiers of Geographical Teaching. (London: 1965 B).

⁶Louis Wirth, "Urbanism as a Way of Life," The American Journal of Sociology, Vol. 44 (July, 1938), p. 10.

standard in the City of Malmö and subsequently to derive structured generalizations about large Swedish cities. This task will be a more tedious one since, to the author's knowledge, there is no official definition for substandard area in Sweden. There will be an attempt to infer some theoretical and workable definition for the term, substandard.

Thirdly, there will be an attempt to examine the spatial distribution of Malmö City by applying the classical ecological models: zonal and sector patterns.

The four models below are hypotheses which will be tested for the purpose of facilitating some understandings of the ecological structure of the city and some special aspects of that structure.

1. It is hypothesized that socioeconomic status and family status are necessary to depict the distribution of subpopulations within the city's subareas.
2. It is postulated that income, social assistance, crime, quality of dwellings, crowded households are measures which compose the socioeconomic status of subpopulations and tend to be associated with substandard areas.
3. It is hypothesized that age of population, age of dwellings, population of households, and ownership are measures which compose the family status of subpopulations and tend to be related to substandard areas.
4. It is postulated that family status is best suited for a zonal pattern, and socioeconomic status is distributed in a sector pattern.

CHAPTER II

THEORETICAL AND EMPIRICAL BACKGROUND

Conceptual Framework

In considering the conceptual framework of the research, two of the three major concepts, which have resulted from the majority of urban factorial ecological studies, are essential elements. These elements can be seen in reality as part of an overall scheme of the development of a complicated physical and social process (see Figure 1).

Now, these layers of development which build the basic foundation of this work will be discussed. The first layer is known as physical space. One of the most basic elements of physical space is land use. The fundamental nature of urban ecology leans on the knowledge of land use. The most identifiable land use types are residential, central business, industrial, and open areas.

If a Factor I (Socioeconomic status) scores are plotted along the vertical axis of a graph and Factor II (Family status) scores are plotted along the horizontal axis, then the space so formed is called social space.¹ The second layer in the development is thus formed, and these two major concepts, socioeconomic status and family status, are considered the most important elements in this study.

An alternative route from spatial divisions is to utilize social space dimensions rather than those of physical space to group the observational units, in the manner of social area analysts Shevky and Bell.² The third layer of this developmental hierarchy is called social space. Although physical space and social space are interrelated, the former must precede the latter in time

¹Brian J. L. Berry and Frank E. Horton, Geographic Perspectives on Urban Systems with Integrated Readings, (Englewood Cliffs, New Jersey: Prentice-Hall, 1970), pp. 306-94.

²Ibid., p. 375.

before the social processes can go into formation.

The fourth layer in the hierarchy of physical and social development is entitled residential areas. The largest single land use type in most cities is residential which gives cause for the necessity of giving it special consideration. After combining social rank (socioeconomic status) and urbanization (family status) in such a manner, Shevky and Williams found residential differentiation. In this residential space, differentiated in types and conditions, this study will first concentrate on one of them. The section on the spatial aspect will deal specifically with all of

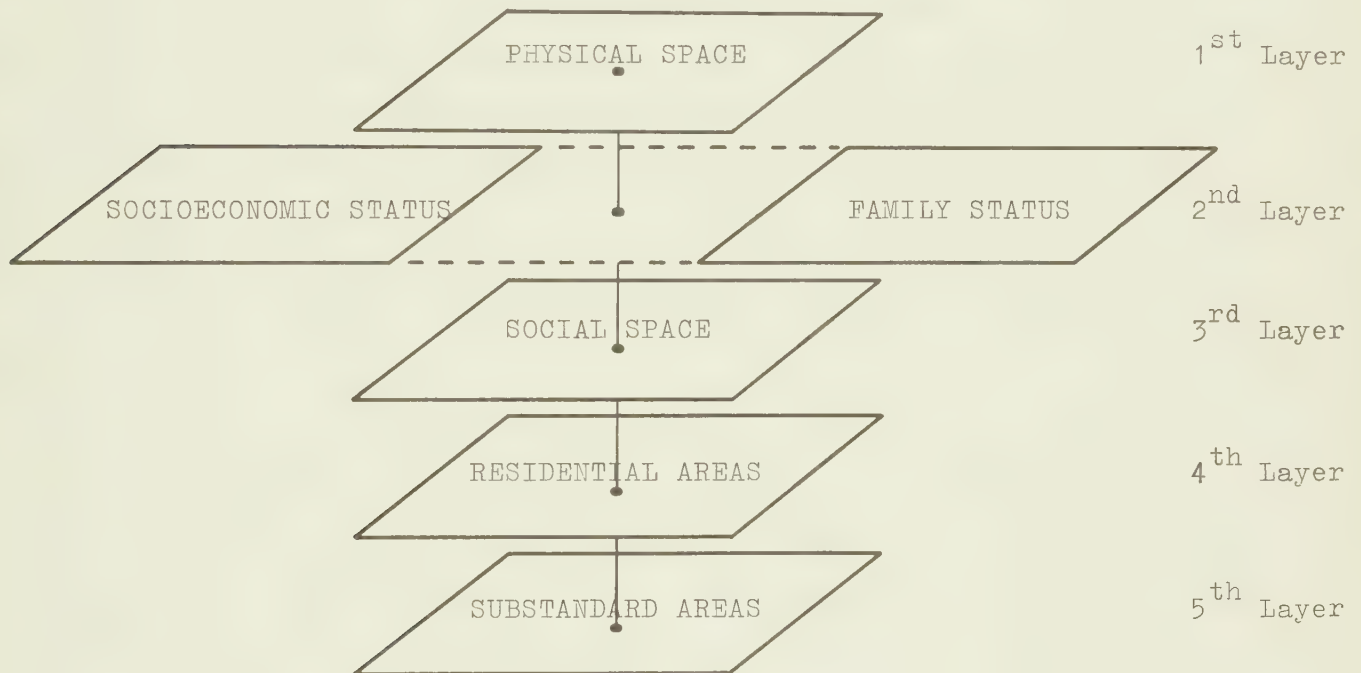


Fig. 1. Urban ecological spatial model

the residential areas or differentiations.

The fifth layer in the physical and social process is substandard areas. The term slum has been avoided because of the vagueness and the thousands of implications attached to the word. The SSA (substandard areas) will be more specifically elucidated so that it is exoteric because all definitions for the concept in Sweden are obscure. Even if no slum problems exist in Swedish cities or urban areas comparable to those in some other countries,

there are, however, many dwellings which neither from social building technical, or city planning technical points of view fulfill the present day standard requirements.³

David Hunter in his discussion on the elements of the slums listed approximately nineteen identifiable features of the slum problem: poverty, run-down housing, crowding, concentration of lower class people, racial concentration, concentration of low educational achievement, low skill, cultural limitations, many welfare cases, internal mobility, crime, health problems, broken families, relocation problems, inadequate community services, skid row, isolation and alienation, dirt, fire hazards, language problems, and the slum atmosphere.⁴ Five of these with some adjustment of terminology, can easily be applied in a Swedish society. In this paper, the SSA elements are called low income, low quality dwellings, crime, social assistance, and overcrowded households. These elements will be discussed in more detail below.

The task of quantifying the SSA as a final layer in the development of the physical and social process of the urban ecology presents a very specific problem in this study.

Empirical Studies

Social area analysis is the foundation from which this research and other factorial ecological studies have been built. Sociologists Shevky, Williams, and Bell derived from a number of postulates concerning industrial society three basic constructs which described the way in which urban populations are differentiated. Social rank (socioeconomic status), urbanization (family status), and segregation (ethnic status) are the three constructs.⁵ Three census variables were used to measure the position of census tract population on economic, family, and ethnic scales and to

³SOU 1954:31, Saneringsfrågan, (Stockholm) 1954.

⁴David R. Hunter, The Slums: Challenge and Response, (New York: The Free Press, 1964), pp. 20-93.

⁵Eshref Shevky and Marilyn Williams, The Social Areas of Los Angeles (Berkeley and Los Angeles: The University of California Press, 1949).

make the classification of census tracts into social areas.

The basic criticism was that there were too few variables utilized for describing the socioeconomic characteristics of census tract population. An improvement was to apply factor analysis in order to isolate the fundamental patterns of variation in the data.⁶

Multivariate analysis is a very useful method in studies of this kind. Multivariate analysis is a process by which one studies the relationship between many variables rather than between two. The desire is to eliminate redundancies within an inter-correlation matrix of census characteristics using multivariate statistical tools such as linkage analysis, component analysis and factor analysis. Component and factor analysis make it possible to study spatial variations in ecological patterns in a way that one maps the scores of census tracts on the components or factors.⁷ The authors of many of the multivariate analyses, which used mostly the factor analysis, were mentioned above in the section on Framework of the study. The two basic constructs or concepts (socioeconomic status and family status) occurred consistently in all of the past and current urban ecological studies.

It is probably suitable here to study the known Scandinavian factorial ecological studies. Pedersen's Copenhagen study is one of the most comprehensive urban ecological analyses to date.⁸ His results showed three basic factors from 14 socioeconomic variables of the population and 76 census tracts of the city during both 1950 and 1960. The three factors were family status, socioeconomic status, and population growth and mobility in that order. In Helsinki with the 1960 Finnish census, F. L. Sweetser did a factorial ecology.⁹ He worked with 42 census variables which resulted in the 2 major concepts or factors: socioeconomic status and some spe-

⁶Berry and Horton, op. cit.

⁷Robert A. Murdie, Factorial Ecology of Metropolitan Toronto 1951-1961, (Chicago: The University of Chicago Press, 1969), pp. 26-31.

⁸Poul Ove Pedersen, Modeller for befolkningsstruktur og befolkningsudvikling i storbyomraderspecielt med henblik på Storkøbenhavn, (Copenhagen: Statens byggeforskningsinstitut, 1967).

⁹Frank L. Sweetser, "Factorial Ecology: Helsinki, 1960," Demography, II (1965), pp. 372-85.

cific areas of family status (feminine careerism, residentialism, established familism, and postgeniture).

Carl-Gunnar Janson, in a research project on classification of administration areas in Sweden, has done a factorial analytical study of 12 Swedish cities with 1960 census.¹⁰ He used 44 census variables, but the quantity of census tracts differed in different cities. The factors derived in the following order: young familism, social rank (socioeconomic status), space (housing), established familism, and post familism (equipment or age). Hans Aldskogius used the factor analytical approach to study the 98 A-region centers of Sweden and to study the set of places in terms of its basic socioeconomic and urban dimensions and to consider the utilization of these dimensions as classification criteria.¹¹

Twenty five variables from the 1965 census were used and five dimensions were clearly defined. Population change, degree of industrialization, and per cent small house dwelling units were the names Aldskogius attached to the first three factors.

The final results of a factor analysis depend upon the nature of the variables which enter the analysis. The analytical technique in all of the above empirical studies is factor analysis.

¹⁰Carl-Gunnar Janson, "A Study of Swedish Urban Spatial Structure," (unpublished paper, Stockholm University, 1970).

¹¹Han Aldskogius, "Dimensions of urban structure in Sweden an Exploratory Factor Analytic study," Forskningsrapporter No. 12 (1969), pp. 3-5.

CHAPTER III

THE CITY OF MALMÖ

Introduction

Malmö City is located on the southwest side of Skåne, the southern most province of Sweden at the Öresund coast. It is the third largest populated city in Sweden and the sixth largest in Scandinavia. Malmö is also the most industrialized city in the south of Sweden. It is a fast developing city with differentiated employment possibilities.

There were nineteen different large districts in the City of Malmö in 1965. The principles used to divide these districts are listed on page 27. They were Gamla Staden, Rörsjöstaden, Slottsstaden, Östra Förstaden, Mellersta Förstaden, Södra Förstaden, Möllevången, Västra Förstaden, Pildammsstaden, Sofielund, Södevärn, Rosengård, Fosie, Limhamn, Husie, Södra Sallerup, Västra Hamnområdet, Östra Hamnområdet, and Bulltofta (see Figure 2).

There were also sub-districts within the larger districts: Ribersborg, Fridhem, Erikslust, Västervång, Mellanheden, Bellevue, Solbacken, Lorensborg, Borgmästaregården, Kroksbäck, Djupsdal, Annetorp, Hyllie By, Blekingsborg, Kulladal, Eriksfält, Söderkulla, Bergdala, Ellstorp, Augustenborg, Persborg, Almhög, Nydala, Maryhill, Gullvik, Hermodsdal, Segevång, Rostorp, Kirsebergsstaden, Håkanstorp, Ulricedal, Hohög, Ellenborg, Valdemars Ro, Riseberga, Kungshälla, Granbacken, Dalvik, Nya Hallstorp, Frollängen, Videdal, Virentofta, and Kvarnby.

Development of Malmö to 1965

Here, a brief history of Malmö's growth will be treated. Malmö, like most seaport towns, did not originally develop from the coast. On the contrary, it has its origin in a small farming village in the neighborhood of a pair of ponds called "Pildammarna" located approximately 2000 meters south of the Öresund coast. A market place developed in that area and continued to



Fig. 2. The City of Malmö: Location Map
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

grow. Around 1270 Malmö, which was then in the possession of Denmark, received its name and was established as a city.

In the beginning of 1500, Malmö became an important trading center and was considered Denmark's second largest city. Between 1520 and the middle of 1700, the population decreased from 6000 to 2000 inhabitants. It became a Swedish city 1658. As mentioned by Lennart Améen, Malmö has spreaded outward into Öresund but only for harbor construction, but settlement housing is still concentrated along the original coast line and has spreaded southward.¹ The construction of a harbor began at the start of 1775. This was the turning point for Malmö's economic life. During the last half of 1800, the settlement began to move from the Gamla Staden district southward to the Södra Förstaden district and continued in that direction into 1900 (see Figure 3). At the beginning of 1900 the population had increased to about 60000. The settlement also began to develop in other directions. The Limhamn district was established by 1922 to the west. Within a twenty year period up to 1942, the city of Malmö had increased its city limits to quite an extent (see Figure 4). There was an extended settlement from Gamla Staden to the west and to the Fosie district to the south. At the end of 1965, Malmö had a population of 248819 and was recognized as an important commercial and industrial city.

Even though Malmö has traditions that go back many years, the city's housing is relatively new. The canal around "Gamla Staden" was Malmö's outer boundaries during the middle of 1800. The building activity increased during 1885 in "Södra Förstaden" and "Rörsjöstaden," and the workers had their neighborhoods in the suburbs.²

Characteristics of the Population Studied 1965

This section will present some facts and figures about the characteristics of the population by examining the development of the population of previous years and comparing this material with data of the other two major Swedish cities and the capital cities

¹Lennart Améen, "Staden och vattnet," Geografiska Notiser, 1965:3.

²Gösta Bringmark, Från Dagaträl till Medborgare, (Malmö: Tryckeriaktiebolaget Framtiden, 1962).



Fig. 3. The Growth of Malmö City: 1862-1922

(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

(After: Stadsingenjörs-
kontorets Planavdelning)



Fig. 4. The Growth of Malmö City: 1942-1962
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26)

(After: Stadsingenjörskontorets Planavdelning)

of Scandinavia.

Change of population

From 1940 to 1965, Malmö's population has gradually but continuously increased (see Table 1). At the beginning of 1940 the total figure was 154270 and increased to 189232 by 1950. By the

TABLE 1
POPULATION AT THE END OF EACH YEAR

YEAR	COPENHAGEN	STOCKHOLM	OSLO	HELSINKI	GOTHENBURG	MALMÖ
1940	971562	737520	433841	358627	353687	189232
1950	961568	779804	447800	401911	380442	205640
1960	923639	808294	477121	452777	405252	229248
1961	918700	807127	480200	464571	408292	233352
1962	911414	804637	482812	477099	410681	237517
1963	901280	800426	484747	489143	414466	241778
1964	885512	793714	485313	497921	418600	245803
1965	870860	787183	485759	506925	421283	248819

end of 1960 the population had risen to 229248, and after a five year period to the end of 1965, the population in Malmö was 248819. There is a population distribution map to show how the population was distributed over the city 1965 (see Figure 5). Malmö's population has increased more than that of Stockholm and Gothenburg. At the end of 1962 and 1963 Malmö's population increased 1.8 and 1.8 per cent both years compared with Gothenburg 0.6 and 0.9 where as Stockholm decreased from -0.3 to -0.5 per cent. The population in Malmö had increased 1.7 per cent at the end of 1964, but in Gothenburg and Stockholm it was 0.9 and -0.8, respectively. Though there had occurred a decline in the increase of the population of Malmö from 1962 to 1965, it still obtained a higher level of increase than both Gothenburg and Stockholm. At the end of 1965 Malmö and Gothenburg showed an increase 1.2 and 0.6, respectively, where as Stockholm had a continuous decrease in population, -0.8 as shown in Figure 6.

Malmö is second to Helsinki in relation to population growth (see Table 1). During the years 1962 to 1965, both Copenhagen and



Fig. 5. Population Distribution in the City of Malmö, 1965
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

Stockholm, the two largest Scandinavian cities, have shown a continuous decrease in population growth. Oslo and Gothenburg have witnessed small increases.

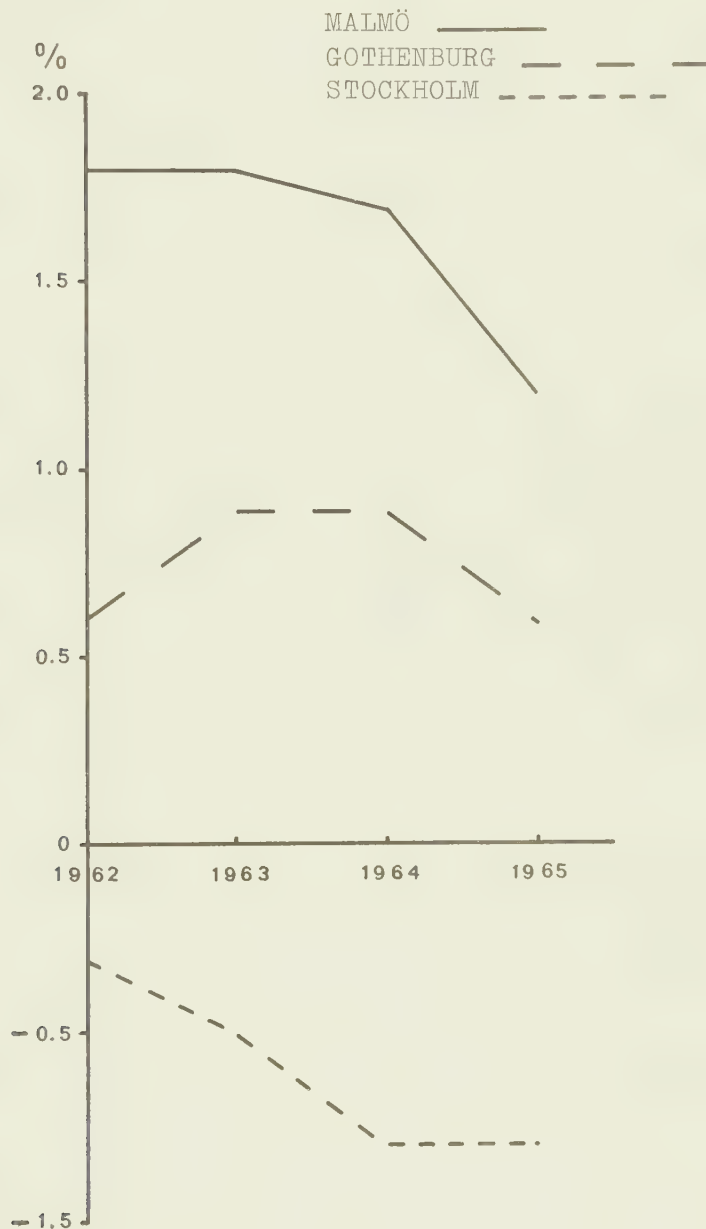


Fig. 6. Population increase and decrease

Distribution of age

An interesting fact about Malmö, when discussing age distribution, is that it seems that some type of magnetism has drawn forth a younger population. In 1965, Malmö had a population of

19.4 per cent, Gothenburg 19.2 and Stockholm 16.4 between the ages of 0 to 14 years (see Table 2). In the age class 15 to 49, Malmö had 50.3, Gothenburg 49.6, and Stockholm 48.3 per cent. This class group may be known as the occupational age range.

From ages 0 to 64 Malmö has a slight edge in this age class with 88.5 per cent compared with Gothenburg 87.9, and Stockholm's 86.5 per cent. There is a remarkable difference in the age group 50 years and over because in Stockholm this age group is 35.2, Gothenburg 31.2, and Malmö 30.3 per cent. This depicts a reverse picture when compared with the age group 0 to 24 years. Explanation to the causes of this phenomenon will not be treated at this point.

Labor force

In Malmö during the year 1965, females represented 38.8 per cent of the total labor force where 42.9 per cent of the total labor force was employed in manufacturing and construction (see Table 3). In Gothenburg the figures were 35.7 per cent and 42.2 per cent, respectively. Stockholm's data showed more diversified results in both categories. The female labor force was 43.1 per cent and 30.8 per cent in manufacturing and construction. The other occupational types will not be elaborated until later in the paper.

Conclusion

However, one must take into consideration that Malmö has expanded its city limits to a great degree taking in all newly developed areas and has incorporated others, where as the newly developed outer areas around Stockholm and other cities are not under the city's administrative control but are cities in themselves.

Much of the younger population in the Stockholm area, for example, is outside the Stockholm city limits but within Greater Stockholm. The same is generally true for Gothenburg and the other large Scandinavian cities.

TABLE 2
AGE OF POPULATION 1965

City	Pop.	Age in per cent				
		0-14	15-24	25-49	50-64	65-
Malmö	248819	19.4	16.2	34.1	18.8	11.5
Gothenburg	421283	19.2	15.9	33.7	19.1	12.1
Stockholm	787183	16.4	16.1	32.2	21.5	13.7

TABLE 3
LABOR FORCE POPULATION 1965

	Malmö	Gothenburg	Stockholm
Males	74014	125002	219197
Females	46973	69261	166021
Total	120987	194263	385218
	per cent		
Agriculture, fishing	1.2	0.7	0.5
Manufacturing, construction	42.9	42.2	30.8
Commerce	22.6	21.4	26.3
Transport., communication	9.3	11.7	9.1
Civil services	23.8	24.0	33.3
Others	0.2	—	—

CHAPTER IV

ANALYTICAL PROCEDURES

This study was made to take an ecological look at the structure of Malmö City's residential areas. In this section the selection of variables will be treated. Here the author tried, to the best of his ability, not to deviate much from the general selection of variables of such similar factor ecological studies done elsewhere in the world.

From the large array of quantitative methods utilized by geographers today, a multivariate statistical technique called factor analysis was used to diminish the large quantity of census variables to a few independent factors which were the cause of the variations among the census variables. To the factors were attached descriptive names to identify the most closely related to the variables which tended to cluster together. Then factor scores were calculated and placed, in each census tract for each factor, on maps.

Finally, the results of the factor analysis and how they can be analyzed in drawing a picture about the urban ecology and sub-standard areas in Malmö City will be treated.

Variables

The variables were selected according to the very essential problems dealing with the social and physical aspects of the ecological city structure (see Table 4). Population distribution is a very pertinent frame of reference for exploring social patterns of area space; where the population is located, the density of the population, what about the age distribution and many other important questions related to the population should be taken into consideration.

In attacking the physical aspects, one must consider, among other things, the construction of the housing, the age and quality

of the buildings. From these two ramifications of the ecology of the city are derived such major concepts as socioeconomic status, family status, and probably some other concepts will arise. These assumptions are made following the support of previous social area analysis and factor ecological studies arriving at similar results with the use of the same basic variables.

The following six main characteristics (26 variables) have been selected to combat a very special problem of seeking out sub-standard residential areas and areas with that potential in Malmö City.

1. Demographic characteristics

- Population
- Population under 16 years
- Population over 60 years
- Population 16 to 44 years

In the present study, the distribution of the population is extremely vital. Here the total number for each census tract has been placed into the analysis of the 1965 census with the two extreme ends on the age continuum, under 16 years and over 60 years of age, as well as a middle range group 16 to 44 years old.

2. Income characteristic

- Average annual income

Instead of carrying six income classes as originally planned, it was decided to make use of only one variable under this characteristic. The average annual net income per person in Malmö was approximately 20000 Swedish crowns; it was used as a variable. The six income classes previously considered ranged from 0 to 20000 crowns could easily have been ambiguous because incomes below 20000 are recognized low or not so desirable incomes.

3. Occupational characteristics

- Manufacturing
- Construction
- Commerce
- Transportation and Communication
- Civil service
- Women 16 years and over in labor force

An ideal achievement would have been to classify the different occupational positions in the separate branches of occupation such as manufacturing, construction, commerce, etc. This was not achieved because of time consumption, but the data used in the present study was sufficient. The women over 15 years of age in the

labor force were included as a variable under this characteristic.

4. Occupied dwellings

- Housing built before 1940
- Housing built 1940 and after
- Dwellings with modern equipment
- Dwellings without bath
- Dwellings without modern equipment
- Dwellings with 2 rooms or less
- Dwellings with 5 rooms or more
- Housing non-profit
- Housing co-operative
- Housing private

These are important characteristics in all factor ecological studies, but in the case of this research the occupied dwellings characteristics are extremely essential because of the very special emphasis placed on the physical structure in attempting to infer substandard residential areas.

The housing built before and after 1940 were used as variables. The dwellings' physical condition, three variables were constructed here. A dwelling known as modern had water pipes, drainage system, toilet, central heating, bath or shower, electric or gas cooking range with oven, and refrigerator. A dwelling without bath lack the last three items above. Dwellings recognized as not modern were without practically all, if not all, of the above items of the modernly equipped dwellings.

The size of the dwellings was divided into two variables: dwellings with 2 rooms or less and dwellings with 5 rooms or more. The ownership of the dwellings was including as 3 variables under the occupied dwellings characteristics. There are the non-profit housing owned by the city or county etc., co-operative housing such as HSB, and the privately owned housing or profit winning dwellings.

5. Household Characteristics

- Households 2 or less persons
- Households 6 or more persons
- Overcrowded households

These characteristics take into consideration the number of persons residing in a dwelling and say something arbitrarily about the crowding of each household. Overcrowded is defined as households which have more than two persons per room, but this does not include the kitchen. The assumption is that these characteristics are also very vital to the very special problems with which

TABLE 4
LIST OF VARIABLES USED IN THE ANALYSIS

No.	Name used in Tables	Definition
<u>Demographic Characteristics</u>		
1.	Population	Population in 1965 of census tract
2.	% pop. under 16	Percentage of the population under 16 years of age
3.	% pop. over 60	Percentage of the population over 60 years of age
4.	% pop. 16-44	Percentage of the population between 16 to 44 years of age
<u>Income Characteristic</u>		
5.	Average annual inc.	Average annual net income per person over 18 years of age 20000 crowns
<u>Occupational Characteristics</u>		
6.	% manufacturing	Percentage of labor force in manufacturing occupation
7.	% construction	Percentage of labor force in construction occupation
8.	% commerce	Percentage of labor force in commerce occupation
9.	% transport. and commun.	Percentage of labor force in transportation and communication occupation
10.	% civil service	Percentage of labor force in civil service occupation
11.	% women 16 and over in labor force	Percentage of women aged 16 and over in labor force

TABLE 4—Continued

No.	Name used in Tables	Definition
<u>Occupied Dwellings</u>		
12.	% housing built before 1940	Percentage of housing units built before 1940
13.	% housing built 1940 and after	Percentage of housing units built in 1940 and after
14.	% dwellings with modern equip.	Percentage of dwellings with modern equipment
15.	% dwellings without bath	Percentage of dwellings with exclusive use of a bath
16.	% dwellings without modern equip.	Percentage of dwellings with exclusive use of most modern equipment
17.	% dwellings with 2 rooms or less	Percentage of dwellings with 2 rooms and kitchen or less
18.	% dwellings with 5 rooms or more	Percentage of dwellings with 5 rooms and kitchen and more
19.	% housing non-profit	Percentage of housing owned by non-profit agencies
20.	% housing co-operative	Percentage of housing owned by co-operative societies
21.	% housing private	Percentage of housing private ownership
<u>Household Characteristics</u>		
22.	% households 2 persons or less	Percentage of households with 2 persons or less
23.	% households 6 persons or more	Percentage of households with 6 persons or more
24.	% overcrowded households	Percentage of households with more than 2 persons per room not counting the kitchen

TABLE 4—Continued

No.	Name used in Tables	Definition
<u>Social Characteristics</u>		
25.	Over average with social ass.	Persons receiving social assistance which is above census tracts' average
26.	Over average crime	Persons committing crimes who live in census tracts and causing them to have crime rates above the city average

this study deals.

6. Social Characteristics

Over the average with social assistance
Over the average crime rate

Two variables are found under the heading of social characteristics. Social assistance and crime rate like income can without doubt fall under the socioeconomic, but to what degrees in terms of power and weight it is difficult to determine.

For social assistance data, a sample of 1132 cases was randomly selected from a population 10982 cases for 1965 in Malmö. From that sample, an average was calculated for each census tract. Social assistance is defined as illness, old age (over pension age or special cases), reduced working capacity, and unemployment. A complete population would have been ideal, but because of the tedious and time consuming task, this was not achieved.

The number of persons guilty of committing crime was placed into the census tracts according to their residence. Subsequently, an average for the city was calculated and considered as data for this research.

The data for the variables, with the exception of income, social assistance, and crime rate, were taken from The 1965 Census of Population and Housing for Malmö City: Central Bureau of Statistics (SCB). For income, the items were obtained from The 1968 Report from the Statistics Office of Malmö City's Finance Department (1966 distribution of income in Malmö). It was feasible to use the data for 1965 census study because of a small change in the population distribution within that one year period. This is the distribution of average income per person, after withdrawn tax, within the census tracts of Malmö City.

The social assistance items were obtained from the Malmö Social Administration's 1965 Social Assistance Bookkeeping. A sample of the social assistance was randomly made of the population. This was mentioned above. Under social assistance, such causes as illness, old age (over pension age), reduced working capacity, and unemployment have been taken into consideration.

The crime rate items were taken from Malmö Police District Investigating Department's Office: Criminal Chronological Record I 1965. Crime rate is defined under Crime against Property, Chapter

8; unauthorized taking and theft of motor and non-motor driven conveyance: car, motor bike, motor scooter, mopeds, bicycle, etc.; burglary (also grave) theft committed by breaking and entering: theft, petty theft in shops and stores, family theft, robbery, grave robbery. The home addresses of the persons who committed the crimes have been considered.

There may quite possibly occur redundancy in the selection of the above variables. Redundancy arises when some variables become related from technical or otherwise trivial and irrelevant causes. This may happen because of careless selection and construction of variables, a limited supply of material, or a very detailed covering of a field.¹

The census tracts

The data for the 1965 Census was collected for 272 census tracts (see Figure 7). There is no standard rule as to how a city in Sweden should be divided into districts or areas or census tracts other than, perhaps, following natural and man made features such as streets and creeks, etc. The Statistics Department in Malmö made an attempt to be as homogeneous as possible in mapping out the 3-digit statistical areas (census tracts) (see Table 5). "In selecting the boundaries for the 3-digit statistical areas, the following principles have been a guide:

1. All traffic routes of importance have been guide lines.
2. Industrial areas have been separated from residential areas.
3. Areas with apartment houses have been separated from areas with single family and two family houses.
4. Residential areas built during different time periods have been separated."²

The decision was made from complete physical aspects. The decision of census tracts selection can become very controversial but that will not be discussed in detail here. Both population and area vary widely between tracts and the socioeconomic characteristics of tract inhabitants can be quite heterogeneous.³ Populations

¹Carl-Gunnar Janson, "Some Problems of Ecological Factor Analysis," Quantitative Ecological Analysis in the Social Sciences, (1969), pp. 301-41.

²Malmö Stad, "Områdesindelning av Malmö för planerings- och statistikändamål." Rapport från statistikavdelningen, 2:1965.

³Amos H. Hawley and Otis Dudley Duncan, "Social Area Analysis: A Critical Appraisal," Land Economics, XXXXIII (November, 1957), pp. 337-45.



Fig. 7. The Census Tracts in Malmö City: 1965
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

TABLE 5
CENSUS TRACTS IN MALMÖ CITY 1965

Identifying Place Name	Census Tract		
Västra Hamnområdet	013		
	014		
Östra Hamnområdet	021	041	
	022		
	024		
	025		
	031		
	032		
	033		
Gamla Staden	100	130	
	101	131	
	110	132	
	111	140	
	112	141	
	120		
	121		
Slottsstaden	200	220	243
	201	221	
	202	222	
	203	223	
	204	240	
	210	241	
	211	242	
Pildammsstaden	224	253	620
	231	390	621
	232	391	630
	244	600	631
	250	601	
	251	602	
	252	603	
Södra Förstaden	300	372	
	301	373	
	303	374	
	304		
	305		
	370		
	371		
Rörsjöstaden	302		
	310		
	311		
	312		

TABLE 5—Continued

Identifying Place Name	Census Tract							
Östra Förstaden	320	472	491	823				
	321	473	492	824				
	330	481	493					
	340	482	494					
	450	483	495					
	470	484	820					
	471	490	822					
Mellersta Förstaden	350	431	464					
	351	440						
	352	441						
	360	442						
	361	460						
	362	462						
	363	463						
Möllevången	364							
	380							
	381							
	382							
	383							
Sofielund	430	420						
	410	424						
	411							
	412							
	401							
	402							
	403							
Södervärn	384	701						
	385	702						
	392							
	400							
	632							
	700							
Västra Förstaden	500	230						
	501	514						
	502							
	510							
	511							
	512							
	513							
Limhamn	515	533	562	549	575	591	546	
	516	535	563	567	576	592	547	
	530	537	564	570	577	540		
	532	552	565	571	580	542		
	534	553	566	572	581	543		
	536	560	660	573	582	544		
	531	561	548	574	590	545		

TABLE 5—Continued

Identifying Place Name	Census Tract					
Rosengård	432	810	857	873		
	421	811	858	874		
	422	812	859			
	423	814	866			
	425	815	870			
	800	856	871			
	806	813	872			
Fosie	520	654	692	722	750	771
	610	670	710	723	751	780
	641	671	711	724	752	781
	642	672	712	730	753	790
	650	673	713	731	760	876
	652	674	720	740	761	875
	653	691	721	741	770	816
Husie	465	841	861			
	850	842	862			
	853	843	863			
	852	844	864			
	851	845	865			
	854	846	877			
	855	860				
Bulltofta	825	821	830	831	840	
Södra Sallerup	880					

TABLE 6
CENSUS TRACTS USED IN THE ANALYSIS

Analysis	Total number of Census Tracts	Number of Census Tracts used	Total number of Tracts used in %
1965	301	272	92.8

in census tracts, in Malmö City 1965, varied from less than 100 to more than 8000, and as one can readily see by looking at the maps that there was also a considerable variance in the acreage of each census tract. The above features are vital criticisms in the unit of analysis, but they are problems extremely difficult to overcome. Relative measures are a reasonable compensation for these problems.

Factor Analysis

The method, factor analysis, studies the complex interrelationships between many variables at the same time as measured for many different observations and summarizing the noteworthy relationships in the form of a few basic patterns or independent variables called factors or dimensions. The observations in this study are called census tracts. The psychologists discovered the method during the first half of the twentieth century for the use of analyzing the intelligence tests' results.

The sociologists have utilized the method more often for geographical type studies than the geographers. "Factor analysis is becoming increasingly helpful to the geographer in reducing a wide range of interrelated yet complexly distributed variables to a simpler pattern of factors, or analytically created surrogate variables."⁴ Geographers have only recently begun using the technique.

"Factor analysis can be applied in order to explore a content area, structure a domain, map unknown concepts, classify or reduce

⁴George W. Carey, "The Regional Interpretation of Manhattan Population and Housing Patterns through Factor Analysis," The Geographical Review, LVI (October, 1966), pp. 551-69.

data, illuminate causal nexuses, screen or transform data, define relationships, test hypotheses, formulate theories, control variables, or make inferences."⁵ In this research paper factor analysis is utilized for classifying or describing and reducing intricate or complex data.

Output of program

The computations were made on the UNIVAC 1108 program by Biomedical Programs (BMD) from the University of California Press.

Below is a list of the following steps:

1. Means and standard deviations
2. Correlation matrix
3. Eigenvalues including cumulative proportions of total variance
4. Eigenvectors
5. Factor matrix
6. Factor check matrix
7. Orthogonal rotated factor matrix
8. Original and successive variances
9. Check on communalities
10. Factor scores printed or on tape

Definition of terms

Below is a list of factor analytic terms which consistently occur during the remainder of this paper.

1. Factors are separate patterns of relationships between the variables.
2. Loading is the degree and direction of relationship of the variables with this pattern.
3. Communality (h^2) is the proportion of variation of each variable involved in the pattern; the sum of squared factor loadings.
4. Per cent of total variance figures show the per cent of total variation among the variables that is related to a factor pattern.
5. Per cent of common variance figures indicate how whatever regularity exists in the data is divided among the factor patterns.
6. Eigenvalues equal the sum of the column of squared loadings for each factor. The positive eigenvalues over one are considered statistically significant. The eigenvalue tells us the importance of each factor.
7. Factor scores: Each variable is weighted proportionally to its involvement in a pattern; the more involved a variable,

⁵R. J. Rummel, "Understanding Factor Analysis," Journal of Conflict Resolution, XI No. 4 (11, 1967), p. 448.

the higher the weight.

General Problems of Spatial Data

There are some general criticisms or problems about correlations, which are treated rather briefly by Duncan and Janson, in a discussion on "Some Problems of Factor Analysis" in Dogan and Rokkan. "The problems of "modifiable units" arise from the fact that the results of correlation analyses between the same characteristics but for different sized areal units may differ markedly."⁶ The conclusions about the behavior of individuals most likely cannot be arrived at by ecological correlations which are based on data summarized by areal unit is the second general problem about correlation techniques. This problem is known as the association between "ecological correlations" and the "behavior of individuals."⁷ Other criticisms with the utilization of factor analysis are: (1) It is difficult to determine how much information disappears in relation to variation because of the method of standardization and mathematics used, and (2) What variations are very weak or very strong are unknown with factor analysis.⁸

Despite these important criticisms mentioned above, much usable, worthy, and valuable information with organized patterns can be accomplished from factor analytic research.

⁶Janson, op. cit., p. 331.

⁷Otis Dudley Duncan, Ray P. Cuzzart, and Beverly Duncan, Statistical Geography: Problems in Analyzing Areal Data, (Glencoe, The Free Press, 1961), pp. 160-75.

⁸Philip H. Rees, "Factorial Ecology: An Extended Definition, Survey, and Critique of the Field," (unpublished paper presented at the meetings of International Geographical Union Commission on Quantitative Methods, 1969), p. 14.

CHAPTER V

CLASSIFICATION OF FACTORIAL ECOLOGY

Introduction

In seeking out the ecological structure of the City of Malmö in 1965, one has discovered that factor analysis has been quite meaningful in classifying and reducing the data to some useful and assumed patterns or dimensions which can, perhaps, illuminate some of the ecological problems in such cities with complex structure.

In this section a detailed description of the total variance of each factor in relation to its eigenvalues will be given. The relationship between the communalities and variables and factor loadings on each factor will be examined here. Factor scores will be discussed thoroughly, and finally, these scores will be mapped on each census tract for each factor. Eventually, a classification of the different residential areas is hoped to be accomplished.

Factor Structure

Before rotation sixteen factors accounted for 66.1 per cent of the total variance but only five of those factors had an eigenvalue greater than one which is usually considered statistically significant. The five principal factors had a total variance and communality of 48.2 per cent (see Table 7). One can logically interpret these factors and classify them with a comparable factor ecological study of Swedish cities accomplished by C.-G. Janson.

If one would examine the communalities in Table 8, which gives the communalities for each variable, one sees that the variables with extremely low communalities are of the occupational characteristics (variables 6-11 and 23) and one under the household characteristics. This can be interpreted as a very low proportion of variation between these types of variables and the five factors or patterns.

TABLE 7
PER CENT OF TOTAL VARIANCE EXPLAINED FOR EACH FACTOR

Factors	Eigenvalues	Per cent of total variance
I	4.6	11.4
II	3.4	11.5
III	1.9	6.8
IV	1.6	12.8
V	1.1	<u>5.7</u>
Communality for five factors		48.2

Factor 1: Family Status

Factor 1 was the most important factor on the unrotated matrix accounting for 17.5 per cent of the total variance but change to 11.4 per cent on the rotated matrix having approximately equal strength to factors 2 and 4.

On the first factor, there are eight loadings greater than 0.30 (see Table 9). The positive values show that there are many people

TABLE 8
COMMUNALITY OF EACH VARIABLE FOR FIVE FACTORS

Variables	Communalities	Variables	Communalities
1	.466	14	.861
2	.509	15	.372
3	.687	16	.743
4	.621	17	.676
5	.341	18	.423
6	.319	19	.578
7	.056	20	.540
8	.274	21	.843
9	.241	22	.601
10	.331	23	.106
11	.360	24	.466
12	.807	25	.474
13	.386	26	.461

between the ages of 16 and 44 years, as well as a large population of children under the age of 16 years. There was also a large group of women at the age of 16 and above involved in employment.

TABLE 9
FACTOR 1: FAMILY STATUS

Variable Name	Factor Loading
3 % pop. over 60	-.770
4 % pop. 16-44	.767
22 % households 2 persons or less	-.621
2 % pop. under 16	.573
12 % housing built before 1940	-.559
11 % women 16 and over in labor force	.441
13 % housing built 1940 and after	.396
15 % dwellings without bath	-.319
23 % households 6 persons or more	.255
17 % dwellings with 2 rooms or less	-.237

Giving consideration to the physical aspect, a great number of the housing was built during the year 1940 and after, which means that most of the houses were not very old. The families were somewhat large because there was a positive loading .255 on variable 23 (% households 6 persons or more).

With respect to low positives, there was a number of dwellings with modern equipment (.147), and the 1965 population on this factor had a loading .135. The occupational characteristics had low positive loadings, for example, manufacturing branches (.116), transportation and communication (.103), and civil service (.101).

The negative loadings indicate that there was an extremely low representation of the age group 60 years and above. Households with two persons or less were represented at a very low degree under this factor. There were not many old houses, and there were not many dwellings without bath.

The above positive and negative loadings are a verification for classifying the variables and assigning a name to the first factor (dimension) which shows young people with relatively large fam-

ilies living in new dwellings, and women 16 years and over are highly represented in the labor force. This last aspect is contradictory to that of countries, such as, Canada and the USA, where just the reverse is true, women are low in the labor force with high family status. The first factor may be called family status in keeping with previous studies of this type which were composed of similar variables.

Observe the census tracts in Figure 8. The factor scores have been broken down into six classes with values from high negative to high positive. Factor scores are standardized scores of the census tracts on each factor. The positive scores illustrate high family status, where as the reverse is the case for negative scores, low family status. There were eight census tracts located in different parts of Malmö with factor scores exceeding +1.50 indicating that these census tracts had extremely high family status, but these eight areas had very low subpopulations.

The Fosie district, situated in the southern part of Malmö, with sub-districts such as, Nydala, Hermodsdal, Viksborg, Söderkulla, Almhög, and Blekingsborg had high family status, where scores ranged from +.76 to +1.50. In the east and northeast, the Husie and Östra Förstaden districts with sub-districts such as, Höja, Hohög, Videdal, Riseberga, Segevång, and part of Kirsebergsstaden had high family status, as well as a cluster of census tracts in the Limhamn district in the southwestern part of Malmö. Augustenborg and Persborg in the Rosengård district and Lorensborg in the Pildammsstaden district were included in the factor score class +.76 to +1.50.

In the class interval +.00 to +.75 which also represents the positive family status, one finds a patch of census tracts in Ribersborg in the Slottsstaden district. There was a stretch from the coast in the Västra Förstaden district moving eastward to the Pildamms Park in the Pildammsstaden district, and there was a cluster of tracts in the Södra Förstaden and Möllevången districts. In the northeast of Malmö in Kirsebergsstaden a cluster of tracts with low positive family status was found.

The negative factor scores show just the opposite of the positive, namely, that in these census tracts were found low family status. Here was found many old people, two persons or less

in the household, and many old houses or houses built before 1940. There was a black streak in the Möllevången and Mellersta Förstaden districts which contains census tracts with extremely low family status with factor scores above -1.50. A belt in the Östra Hamnområdet district was found, which had an extremely small sub-population.

A cluster of census tracts was found in the Möllevången district, which belong to the factor scores class that range from -.76 to -1.50. This was considered a low family status interval. There was another small patch of census tracts in the Slottsstaden district, and there were a few remaining census tracts belonging to this group or class dispersed in different areas in Malmö. In the next factor scores interval class, the values range from -.00 to -.75. The families were small, but the people were not extremely old. In the western part of the city, there was a cluster of census tracts in the Västra Förstaden and Limhamn districts, as well as a cluster in the Rosengård and Fosie districts. There was a large surface of area which was densely populated in the far east of town in the Husie and Södra Sallerup districts.

Approximately half of the census tracts in the City of Malmö at the end of 1965 had a positive family status which dominated, above all, the residential areas built up after 1940.

Factor 2: Socioeconomic Status

The second factor is almost equally as strong as the first and fourth accounting for 11.5 per cent of the total variance. The positive loadings exemplify a low socioeconomic status, where as a high socioeconomic status is found on the negative loadings. Many dwellings were of a two rooms or less format (see Table 10). This factor shows an emphatic crime rate. There was a high population in the census tracts, and the households were overcrowded. There was a large sum of households with two persons or less where many of the houses were owned by co-operative societies. As in the family status, the labor force was well represented with women 16 years of age and above. Many people were employed in the manufacturing branches.

One can complete the picture with low positive loadings with the population between ages 16 and 44 years (.144) and with another occupational characteristic transportation and communication em-

TABLE 10
FACTOR 2: SOCIOECONOMIC STATUS

Variable Name	Factor Loading
17 % dwellings with 2 rooms or less	.774
26 Over average crime	.639
18 % dwellings with 5 rooms or more	-.619
24 % overcrowded households	.618
5 Average annual income	-.514
6 Population	.511
22 % households 2 persons or less	.419
20 % housing co-operative	.338
11 % women 16 and over in labor force	.336
6 % manufacturing	.290

ployments (.104).

The negative loadings show that there were not so many dwellings with 5 rooms or more and that the dwellers come well below the average income. Contradictory to the below average income, social assistance cases in factor 2 were below Malmö City's average. Private housing was not very prevalent (-.223). There was a very low population under the age of 16 (-.203), and the households with 6 persons or more were not plentiful (-.173).

The loadings under factor 2 indicate that, because of its close association with occupation and low income, this factor shows a low economic status. In addition to that, measures of overcrowding such as a large number of persons per room and high crime rate depict a low social status. Because of the above fact, this factor can logically be identified as or called socioeconomic status. If there was a continuum, the other end would indicate that there is a high socioeconomic status.

Here, it can appropriately be stated that there is a close association between low socioeconomic status and SSA. The two terms will be utilized interchangeably in this present study. SSA was theoretically define previously, but after the analytic results of factor 2, the term is more specifically defined as an equivalent

to low socioeconomic status.

The positive factor scores on factor 2 indicate that there was a low socioeconomic status (see Figure 6). Scores exceeding +1.50 mean that the census tracts have an exceptionally low socioeconomic status. There were eleven such census tracts 1965. Three tracts were found in the Södervärn district, one in the Möllevången district, and two in the Sofielund district. There was one census tract in the Rörsgästaden district. Ellstorp and two tracts in Kirsebergsstaden were found in the Östra Förstaden district.

One can image an ax-shaped figure with the handle going diagonally downward from the northeast part of town and the metal head being lodged intensely in the center of town. In this ax-shaped area was found approximately 90 per cent of the census tracts with scores ranging from +.76 to over +1.50 or very low socioeconomic status to an extremely low socioeconomic status, respectively. Census tracts with scores from +.76 to +1.50 were found in the entire district of Möllevången, much of the Sofielund and Södra Förstaden, and most of the Östra Förstaden districts. Augustenborg and Persborg in the Rosengård district were also included in this class interval, as well as Nydala and Almhög in Fosie. A patch of census tracts in the low socioeconomic status was found in the Limhamn and Slottsstaden districts. Census tracts with scores from +.00 to +.75 were dispersed in different parts of Malmö.

The negative scores indicate which census tracts that had a high socioeconomic status. The extremely high socioeconomic census tracts were Fridhem, Västervång, and Bellevue in the Västra Förstaden district. Most of the census tracts in the Västra Förstaden and Limhamn districts had scores between -.76 to over -1.50. The Husie district which included Riseberga, Granbacken, Dalvik, Hohög, and Videdal had a very high socioeconomic status, -.76 to -1.50. Many of the census tracks to the extreme east had high socioeconomic status.

Many of the census tracts that had high family status had correspondently low socioeconomic status, for example, Persborg, Augustenborg, Almhög, Nydala, two census tracts in Kirsebergsstaden, and others.

Factor 3: Housing

The third factor accounted for 6.8 per cent of the total variance but had a 7.2 per cent total variance on the unrotated factors. A great number of the dwellers lived in the state, county, and city owned non-profit houses (see Table 11). The dwellers received social assistance well over the average for Malmö City. There were dwellings with exclusive use of a bath. The above variables had positive loadings on factor 3.

The negative loadings demonstrate that there were practically no private houses and not many from the subpopulations were employed in the commerce branches of employment. The dwellings were without modern equipment, and the dwellers had incomes below the city average. The houses were not so very old, and the sizes of the apartments were small. There was a low population in the age group over 60 years. The loadings also exhibit that a small quantity of houses were owned by co-operative organizations.

This rounds out the more interpretable values under factor 3. The positive loadings shown expressed low quality housing and the negative loadings just the opposite. Janson had basically the op-

TABLE 11
FACTOR 3: HOUSING

Variable Name	Factor Loading
21 % housing private	-.784
19 % housing non-profit	.753
8 % commerce	-.428
25 Over average with social assistance	.304
14 % dwellings with modern equipment	-.189
5 Average annual income	-.188
12 % housing built before 1940	-.186
18 % dwellings with 5 rooms or more	-.184
15 % dwellings without bath	.179
3 % pop. over 60	-.158

posite results and interpreted the factor as housing or space. In this present study, the term housing is sufficient.

Census tracts with positive factor scores over +1.50 show that there were extremely many houses in these areas that were non-profit (see Figure 10). There were approximately 20 to 25 such census tracts dispersed over Malmö. Persborg in the Rosengård district was a typical example. There were census tracts with factor scores ranging from +.76 to +1.50 or very many non-profit dwellings. Some of these tracts were Augustenborg in the Rosengård district, and Lorensborg in the Pildammsstaden district.

Most of all, the largest majority of census tracts in the City of Malmö had negative factor scores which mean that most of the dwellings were not non-profit but many were private dwellings. Practically all of the census tracts in the Västra Förstaden and Limhamn belonged to this category, as well as the Gamla Staden and Möllevången districts.

Factor 4: Young Familism

Factor 4 accounted for 12.8 per cent of the total variance, therefore being the strongest factor even though its value is almost equal to factors 1 and 2 (see Table 12). The positive loadings show that there were many dwellings with modern equipment and that many houses were owned by co-operative organizations. The houses were relatively new or built 1940 and after. There were large populations in the census tracts involved. A great number of people in the age group from 0 to 16 years was found. Much of the population was employed in the commerce branches of employment.

There were low positive loadings in transportation and communication branches (.198) and civil service (.182). The average annual income (.183) under factor 4 had the highest factor loading for variable five among the five factors. This indicates that the subpopulations were above the average annual income for Malmö City in 1965.

Negative loadings show that there were practically no dwellings without modern equipment and very few houses were built before 1940 or were private. There were not many social assistance cases. Apparently, there were not many households with two persons or less and not many persons over 60 years.

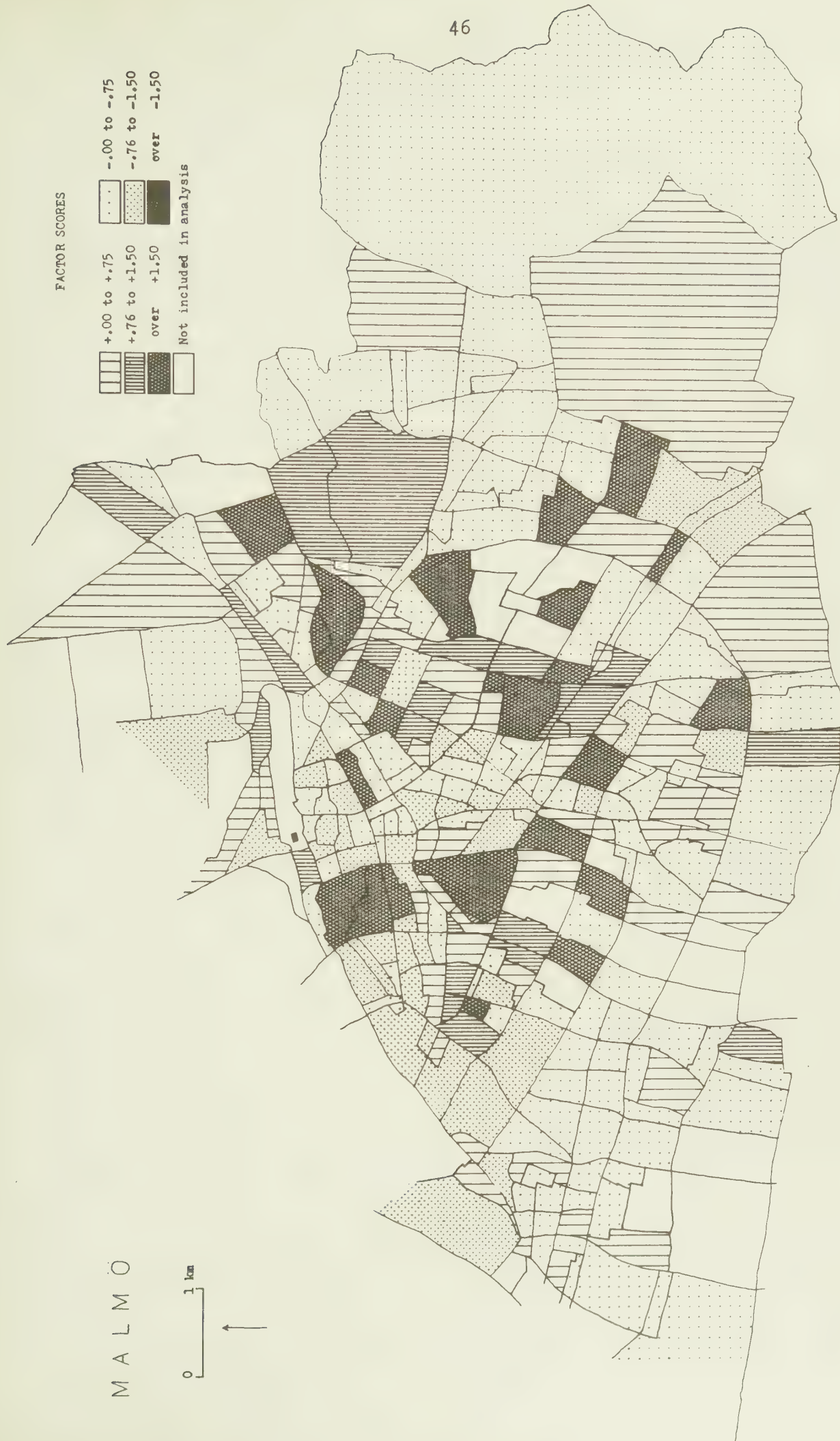


Fig. 10. Housing: 1965
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26)

TABLE 12
FACTOR 4: YOUNG FAMILISM

Variable Name	Factor Loading
14 % dwellings with modern equipment	.863
16 % dwellings without modern equipment	-.852
12 % housing built before 1940	-.673
20 % housing co-operative	.621
13 % housing built 1940 and after	.464
1 Population	.408
21 % housing private	-.407
2 % pop. under 16	.340
8 % commerce	.280
25 Over average with social assistance	-.221

For factor 4 it is evidently practical to utilize Janson's term young familism since the factor loadings in this study and on this particular factor are similar to his on a given factor.¹

Census tracts with factor scores exceeding +1.50 were found in the Pildammsstaden district which was represented with a cluster of tracts, and there was the Söderkulla in the Fosie district. In the class interval between +.76 to +1.50 were found Persborg, Augustenborg, Almhög, Nydala, Viksborg in the south and the Sofielund and Möllevången districts in the central zones (see Figure 11). The Limhamn and Västra Förstaden districts fell in +.00 to +.75 interval class.

The Gamla Staden district in the north central part of town and the Husie and Södra Sallerup districts to the far east were at the other end of the continuum with high negatives indicating not young families. There were even fourteen census tracts dispersed in different parts which had extremely low young familism.

¹Janson, "A Study of Swedish Urban Spatial Structure," loc. cit., p. 6.

Factor 5: Blue Collar Employment

Factor 5 is the weakest factor which accounted for 5.7 per cent of the total variance. The positive loadings indicate that the population employed in the manufacturing industries and transportation and communication branches lived, to a great extent, in dwellings without bath, and the households were somewhat overcrowded (see Table 13). There were rather many people in both age groups, over 60 and under 16 years. There was a sufficient number of the population employed in construction (.143).

TABLE 13

FACTOR 5: BLUE COLLAR EMPLOYMENT

Variable Name	Factor Loading
10 % civil service	-.531
25 Over average with social assistance	-.519
15 % dwellings without bath	.463
6 % manufacturing	.460
9 % transport. and communication	.424
24 % overcrowded households	.279
14 % dwellings with modern equipment	-.229
11 % women 16 and over in labor force	-.222
3 % pop. over 60	.176
2 % pop. under 16	.153

Negative loadings show that few people were employed in civil service branches and few social assistance cases. There were only a few dwellings with modern equipment and few women 16 and over in the labor force.

This factor can sufficiently be called the blue collar employment since there are high positive loadings in the unskilled, semi-skilled, and skilled branches of the labor industries.

The majority of the census tracts on the factor had scores ranging from +.00 to +.75. This means that there were many blue collar workers (see Figure 12). The Västra Förstaden district was just the opposite of the above with negative scores. There were

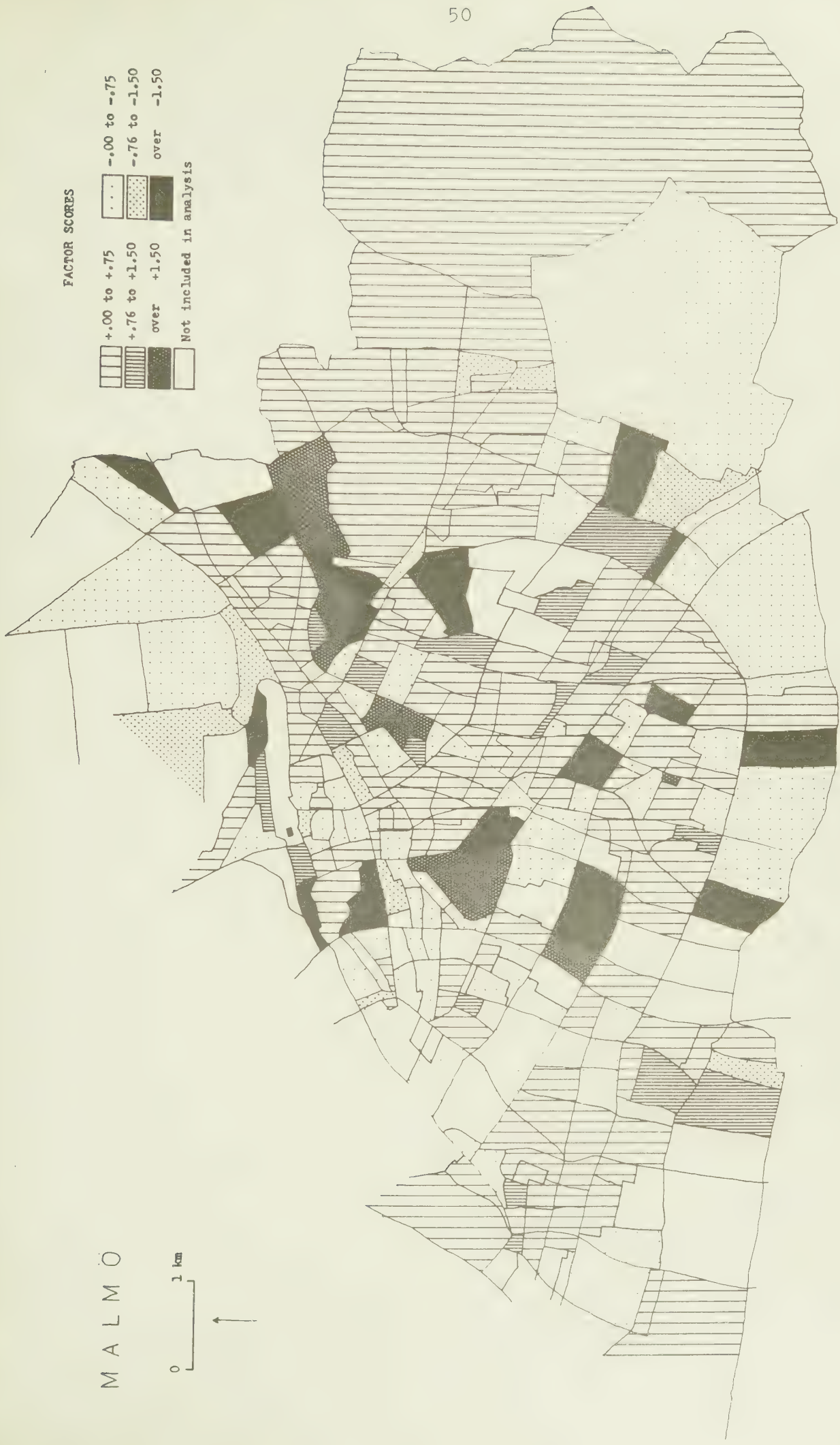


Fig. 12. Blue Collar Employment: 1965
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also some patches of tracts in the Limhamn district and sub-districts such as, Borgmästaregården and Blekingsborg. There were some extreme census tracts on both the positive and negative scores.

CHAPTER VI

EVALUATION OF THE ANALYSIS

If one reverts to the urban ecological spatial model constructed in Chapter II of the present study, one finds that the last stage in the model is substandard area (SSA). Although there are interconnections between the five layers of development, the second and fifth layers are directly related according to the factor analysis results. Certain socioeconomic aspects, in this case low socioeconomic status, together with certain family cycle aspects which play a lesser role are combined to form the SSA (see Figure 13). The first, third, and fourth layers are extremely important in the explanation of the ecological spatial model, but here the second and fifth layers will be explicitly dealt with.

Within the factor score class intervals, now, used as indexes, positive scores indicate low socioeconomic status and negative factor scores depict high socioeconomic status. The factor scores on the low socioeconomic status (positive scores) can be imagined as

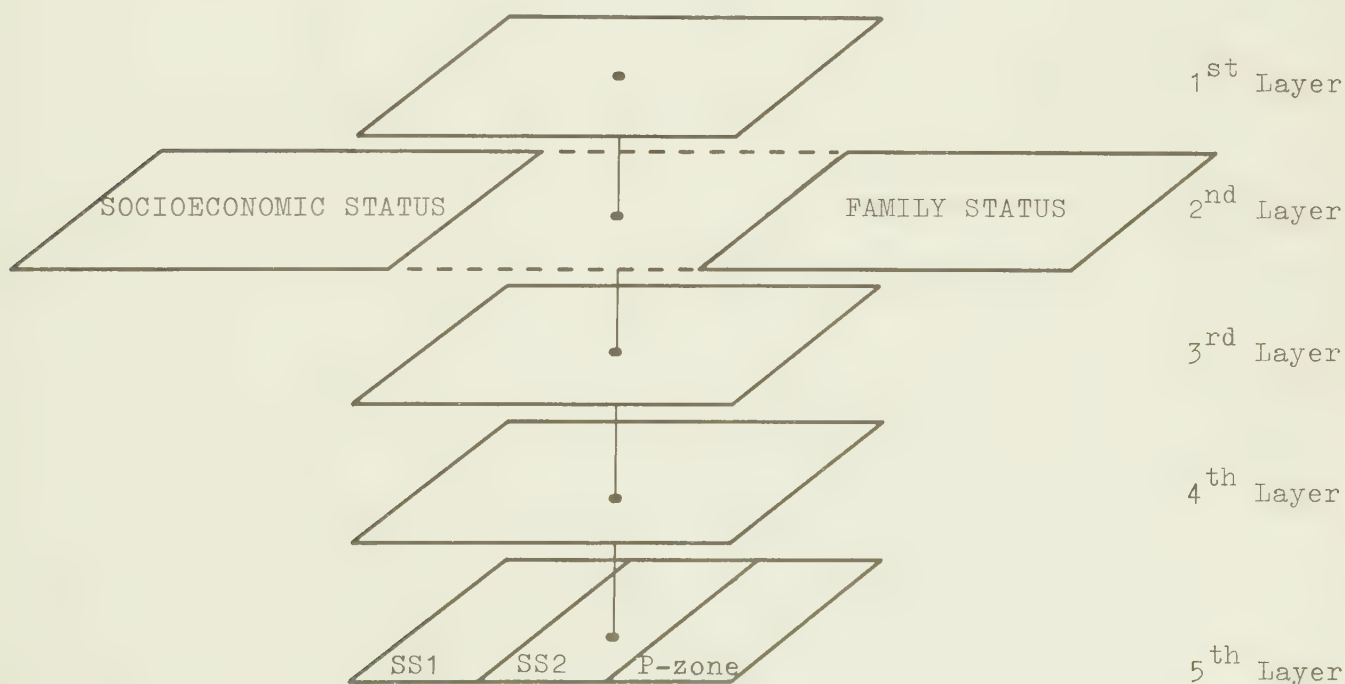


Fig. 13. Urban ecological spatial model

the three SSA stages. Here, the fifth layer is theoretically divided into three equal parts even though it is realized that in reality the possibility that the different degrees of substandard areas being equal is extremely small (see Figure 13).

1. First stage: Substandard one (SS1), is defined as basically census tracts which are either physically, completely without hope of renovation, within reasonable economic limits, and are prepared for obliteration or are socially in despair. The limits for stage one, in this study, are arbitrarily set with factor scores above +1.50. These areas are mainly composed of old, run-down dwellings which have not been kept up to good standard.

As mentioned above there were eleven census tracts that fell under this category. The census tracts are 384, 392, and 403 in the Södervärn district, 381 in the Möllervången district, 410 and 430 in the Sofielund district, 302 in the Rörsgjörstaden district, 450, 482, 492, in the Östra Förstaden district, and 576 in the Limhamn district (see Figure 14).

As was stated early, in the interpretation of the factor loadings on factor 2 (Socioeconomic Status), these were the census tracts composed of many dwellings with two rooms or less, where the crime rate was extremely high, and where there were very many overcrowded households. The tracts were well below the average annual income. A great portion of the city's population was gathered in these areas. Many of the households had two persons or less, and many of the dwellings were controlled by co-operative organizations.

There were many women 16 years of age and older in the working force of Malmö. A large number of the people in these census tracts were employed in the manufacturing branches. In eight of the SS1 census tracts, 82 per cent of the dwellings was built before 1940, where as 63 per cent of the dwellings of the total of eleven SS1 census tracts was built before that year. This is evidence enough to indicate that most of the SS1 areas were located in the older districts



Fig. 14. Substandard one census tracts
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of Malmö where many of the dwellings were built before 1920. It is quite amazing that not one of the twelve census tracts in the Gamla Staden district (CBD), one of the oldest districts in the city, fell into the SS1 category. Approximately one kilometer to the south and to the east of the Gamla Staden district were found the abundance of SS1 census tracts. The districts south of Gamla Staden are Södevärn, Möllevången, Sofielund, and Rörsjöstaden where the majority of SS1 tracts are located. The district to the east is called Östra Förstaden; here, the SS1 tracts were situated in the sub-district Kirsebergsstaden.

2. Second stage: Substandard two (SS2), means that the census tracts are extremely low in both physical and social standards, but there are still possibilities for physical renovation or repair. Some of the houses under this stage may not be so old. The factor score limits for substandard two are between +.76 and +1.50. Keep in mind that these limits are flexible and, above all, subjective.

Under Substandard two were 53 census tracts. Census tracts 320, 321, 330, 340, 483, 490, 491, 493, 495, 820, and 823 were located in the Östra Förstaden district. There were 311 and 312 in the Rörsjöstaden district; 350, 360, 361, 362, 363, 430, and 432 in the Mellersta Förstaden district; 304, 305, 371, 373, 374 in the Södra Förstaden district; 380, 382, 383, and 384 in the Möllevången district; 411 and 420 in the Sofielund district; 385, 400, and 632 in the Södevärn district; 204, 220, and 223 in the Slottsstaden district; 224, 390, and 391 in the Pildammsstaden district; 573, 575, and 591 in the Limhamn district; 423, 425, 810, 811, 857, and 866 in the Rosengård district; 730 and 741 in the Fosie district; and 865 in the Husie district (see Figure 15).

During this second stage the census tracts were not at the extreme end of the SSA continuum. There are lesser degrees of the substandard aspects of the factor loadings' interpretation given under Substandard one. One can very clearly see in Figure 17 that where Substandard one census



Fig. 15. Substandard two census tracts
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tracts were found, Substandard two census tracts surrounded them.

There must be an influence of Substandard one areas over Substandard two areas, but to what degree is difficult to determine. The spread of SSA is very likely provided immediate action is not taken. More than 50 per cent of the SS2 tract dwellings was built before 1940 although the districts under this category are not predominantly composed of old dwellings. On the contrary, many of the dwellings were somewhat recently constructed, after 1940. This indicates that the physical aspect is not heavily important. Basically, the SS2 census tracts were found in the older districts immediately, geographically attached to Gamla Staden, but the SS1 tracts were somewhat further removed, in distance, from Gamla Staden. As in the SS1 category, census tracts in the Gamla Staden district were not represented here. The older districts falling under the SS2 category were Östra Förstaden, Rörsjöstaden, Mellersta Förstaden, Södra Förstaden, Möllevången, Sofielund, Södervärn, Slottsstaden, Pildammsstaden. The newer districts, which were most obviously social in character, were Limhamn, Rosengård, Fosie, and Husie. These districts composed of SS2 tracts, with few exceptions, were located due south and east of the Gamla Staden district.

3. Third stage: Potential zone (P-zone), this term means that the census tracts are in the process of going through a transition. The possibilities that they reach Substandard two and eventually Substandard one are great provided no progress for betterment is achieved. These areas can be basically filled with social problems and less with physical aspects as in stages one and two. The limits for the Potential zone are +.00 and +.75.

In the Potential zone were census tracts 553, 560, 562, 563, 571, 572, 574, and 580 in the Limhamn district; 230 and 501 in the Västra Förstaden; 201, 202, 210, 221, 223, and 243 in the Slottsstaden district; 014 in the Västra Hamnorådet district; 031 and 032 in the Östra Hamnom-



Fig. 16. Potential zone census tracts
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rådet; 100, 101, 110, 131, 132, and 140 in the Gamla Staden district; 310 in the Rörsjöstaden district; 481 and 824 in the Östr Förstaden district; 351, 442, and 463 in the Mellersta Förstaden district; 301, 303, 370, and 372 in the Södra Förstaden district; 231, 232, 244, 250, 251, 620, 621, 630, and 631 in the Pildammsstaden district; 700, and 701 in the Södervärn district; 401, 402, 412, 424, and 422 in the Sofielund district; 421, 800, 859, 871, and 813 in the Rosengård district; 642, 650, 652, 654, 670, 673, 721, 722, 731, and 753 in the Fosie district; and 855 in the Husie district (see Figure 16).

It is characterized that many of the Potential zone census tracts are physically near Substandard two as if there was a continuous spread from Substandard one through Substandard two to the Potential zone (see Figure 17). Areas with an index very near +.00 were practically normal in relation to the census tracts in the City of Malmö as a whole. Forty-eight per cent of the census tracts come under one of the three SSA stages, where as a little over half of the 48 per cent or half of the SSA census tracts was in the Potential zone. A sizable portion of those were near normal. Half of the census tracts in the Gamla Staden district was considered under the P-zone category. This could be interpreted that these tracts were extremely near normal. It is presumptuous to assume that it is basically because of the physical conditions, but from all indications such is not the case because 68 per cent of the dwellings in Gamla Staden was constructed before 1920. In four census tracts in this district, over 50 per cent of the dwellings was built before 1900. The P-zone census tracts were found in practically every district mentioned in the above two SSA categories. In districts where the bulk of the dwellings were built after 1940, a remarkable number of P-zone tracts were apparent. The Rosengård, Fosie, and Husie districts were such cases, for example.

Although family status and socioeconomic factors are independent of each other, many of the census tracts that had a very high family status showed a very low socioeconomic status and vice ver-

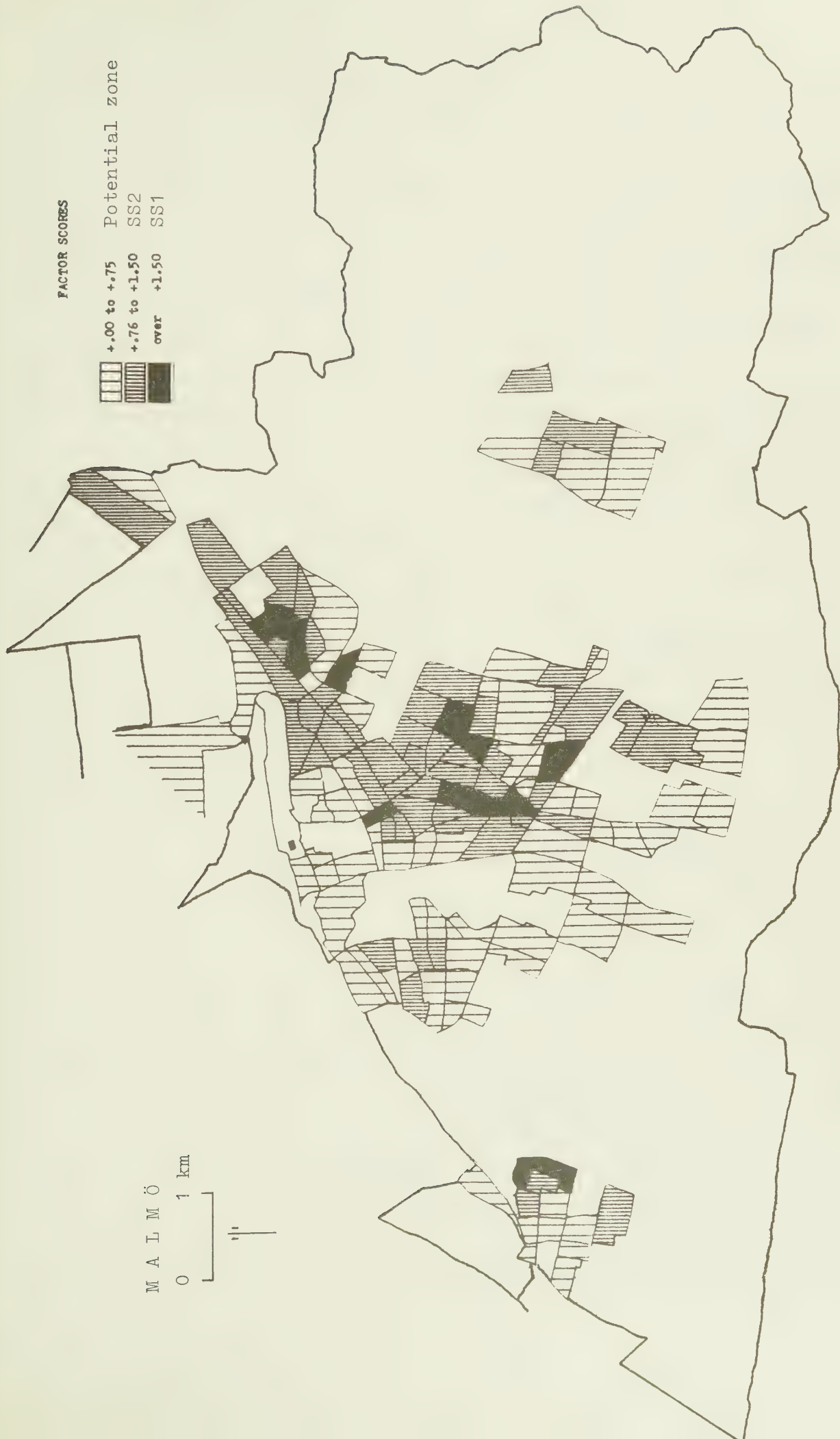


Fig. 17. Census tracts for three stages of SSA
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sa, as shown on the factor score map. A graph has been constructed to show the position of census tracts in social space (see Figure 18).

Approximately 32 per cent of the census tracts, as an example, was placed on the graph in order to get an idea as to what position the different districts in Malmö held in social space. The large low socioeconomic families were predominantly found in the Östra Förstaden and Rosengård districts. The large high socioeconomic families were mostly located in the Limhamn and Husie districts. The Västra Förstaden and Limhamn districts dominated the small high socioeconomic families. Finally, the small low socioeconomic families were mainly in the central part of the city where districts, such as, Mellersta Förstaden, Möllevången, Sofielund, Rörsjöstaden, Södervärn, Södra Förstaden, and even Östra Förstaden, were located. There were four extreme census tracts on the low family status, which were located in the Västra and Östra Hamnområdet districts. This indicates that the families were small and old.

Perhaps more can be interpreted from the analytic results, but the author has evaluated the above procedures which in turn answered some puzzling questions about the ecological spatial process in the City of Malmö.

Detailed analysis of Substandard one

Here, the census tracts under these three stages of development will be look at in more detail. Under Substandard one, the analysis discovered eleven census tracts. Table 14 shows all the percentages for all the below mentioned variables in each SS1 census tract.

In census tract 384, 92 per cent of the dwellings was built before 1920, 2.3 per cent was built between 1921 and 1940, and 5.8 per cent was constructed between 1961 and 1965. Within the occupational categories, 34.6 per cent of the labor force in this census tract was employed in the manufacturing branches, 9.6 per cent in the construction branches, 16.9 per cent in the commerce branches, 8.9 per cent in transportation and communication, and 20.5 per cent of the labor force within civil service areas. Also 52.1 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 50.2 per cent of the

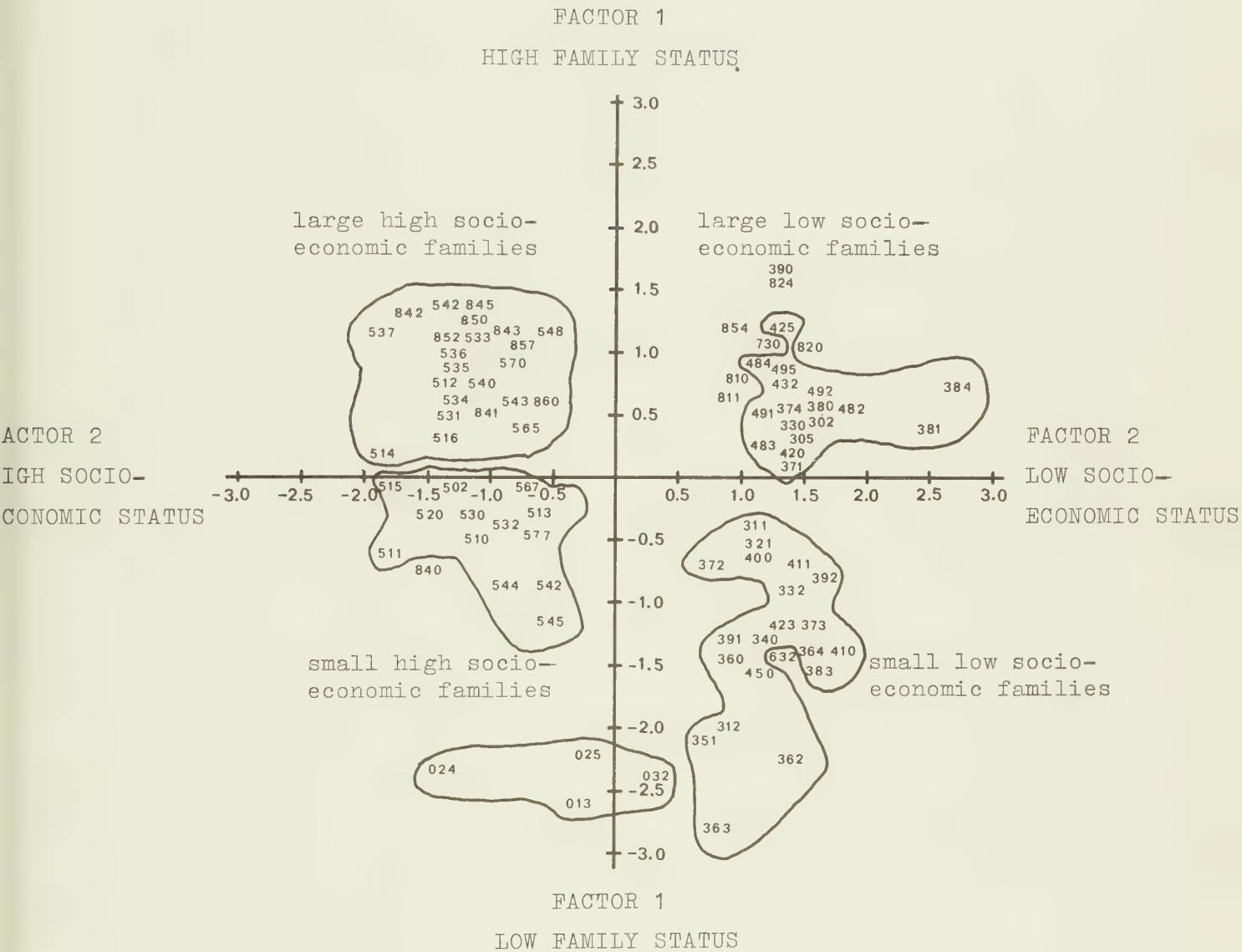


Fig. 18. Two-Dimensional Factor Score Social Space Graph
With Family Status and Socioeconomic Status

population was in the age group of 0 to 29 years of age, where as 16.4 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average and the highest for Malmö in 1965. Social assistance, also, was highest for Malmö, in census tract 384, being well over the city average. One hundred per cent of the dwellings was privately owned. The data showed that 82.5 per cent of the dwellings was without modern equipment, 8.8 had modern equipment, and 8.4 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 69 per cent of the total, where as 24.9 per cent had two rooms and kitchen, and 5.9 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 384 was below the average income. Figure 19 shows a picture of this tract in 1971.

In census tract 392, 91 per cent of the dwellings was built before 1940, 4.4 per cent was built between 1941 and 1950, and 4.6 per cent was constructed between 1951 and 1960. Within the occupational types, 34.8 per cent of the labor force in this census tract was employed in the manufacturing branches, 10.1 per cent in the construction branches, 21.7 per cent in the commerce branches, 7.2 per cent in transportation and communication, and 25.4 per cent of the labor force within civil service areas. Also 49 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 27.4 per cent of the population was in the ages of 0 to 29 years of age, where as 28.1 per cent of the dwellers was 60 years of age and older. The crime rate was just below the city average. Social assistance was above the city average. In fact 85.4 per cent of the dwellings was privately owned and 4.5 per cent was owned by co-operative organizations. The data showed that 6.1 per cent of the dwellings was without modern equipment, 86.7 had modern equipment, and 6.8 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 60 per cent of the total, where as 33.3 per cent had two rooms and kitchen, and 6.2 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households, even though the households with two persons or less were 76 per cent. Census tract 392 was below the average income.

TABLE 14

PER CENT OF VARIABLES IN SS1 CENSUS TRACTS

Names	302	381	384	392	403	410	430	450	482	492	576
% housing built before 1920	99.8		92.0							18.1	
% housing built between 1921-1940			2.0								
% housing built before 1940		94.6	94.0	90.0	57.0	98.6	20.9	70.8	50.8		2.8
% housing built 1940 and after	0.2	5.4	5.0	9.0	43.0	1.4	78.1	28.9	46.2	81.9	97.9
% manufacturing	38.6	38.0	34.6	34.8	43.0	37.8	37.0	35.7	39.7	40.9	9.1
% construction	8.1	11.0	9.6	10.1	11.6	10.1	10.6	8.9	8.6	9.1	8.9
% commerce	18.3	22.5	16.9	21.7	16.2	22.5	21.7	22.2	13.1	17.7	19.5
% transport. and commun.	8.1	7.1	8.9	7.2	7.9	9.0	10.4	11.3	18.9	9.7	7.3
% civil service	25.2	20.2	20.5	25.4	18.8	19.4	19.3	21.2	14.7	22.0	16.9
% women 16 and over in labor force	52.5	51.3	52.1	49.0	53.4	41.9	50.6	42.0	54.2	56.1	53.5
% pop. 0-29 yr.	43.8	39.9	50.2	27.4	48.2	24.7	37.2	24.3	47.1	44.0	47.6
% pop. over 60 yr.	22.4	17.3	16.4	28.1	19.6	36.1	16.3	36.6	13.4	11.8	9.3
City's average crime rate	1 ^a	1	1	2 ^b	1	1	1	2	1	1	1
City's average social assistance	1	1	1	1	1	1	1	2	1	2	1
% housing private	100	54.6	100	85.4	97.4	63.3	18.5		6.1	52.7	42.8
% housing co-operative		13.7		4.5		36.7	80.1	99.8	87.9	42.9	44.9
% housing non-profit		31.8			2.6		1.2	0.2	6.1	4.3	12.3
% dwellings without modern equip.	89.9	13.4	82.5	6.1	70.9	2.5	4.7	0.4	42.6	13.8	1.2
% dwellings with modern equip.	4.4	72.1	8.8	86.7	13.3	88.3	92.0	99.3	46.3	76.3	82.2
% dwellings without bath	5.6	14.4	8.4	6.8	15.5	8.9	3.1	0.2	10.4	9.3	16.5
% dwellings with 1 rm. and kitchen	40.6	54.5	69.0	60.0	65.9	64.3	26.3	20.1	34.0	38.8	27.3
% dwellings with 2 rm. and kitchen	39.3	35.2	24.9	33.3	28.1	32.4	52.9	68.4	55.5	51.6	50.5
% dwellings with 3+ rm. and kitch.	20.1	10.3	5.9	6.2	5.2	3.0	20.6	11.5	9.3	9.5	21.0
City's average overcrowded housing	1	1	1	1	1	1	1	2	1	1	1
City's average annual income	1 ^c	1	1	1	1	1	1	1	1	1	1

^a1 indicates above City's average in crime rate, social assistance, and overcrowded housing.

^b2 indicates below City's average in crime rate, social assistance, and overcrowded housing.

^c1 indicates below City's average annual income.

In census tract 381, 94.6 per cent of the houses was constructed before 1940, 2.9 per cent was built between 1941 and 1950, and 2.5 per cent was completed between 1951 and 1965. Within the occupational categories, 38 per cent of the labor force in this census tract was employed in the manufacturing branches, 11 per cent in the construction branches, 22.5 per cent in the commerce branches, 7.1 per cent in transportation and communication, and 20.2 per cent of the labor force within civil service areas. Also 51.3 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 39.9 per cent of the population was in the ages of 0 to 29 years of age, where as 17.3 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average. Social assistance was, in census tract 381, over the city average. A percentage of 54.6 was for the privately owned dwellings, 31.8 per cent was non-profit dwellings, and 13.7 per cent was owned by co-operative organizations. The data showed that 13.4 per cent of the dwellings was without modern equipment, 72.1 had modern equipment, and 14.4 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 54.5 per cent of the total, where as 35.2 per cent had two rooms and kitchen, and 10.3 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 381 was below the average income.

In census tract 403, 57 per cent of the dwellings was built before 1940, 54.3 per cent was built between 1921 and 1940, and 42.4 per cent was constructed between 1941 and 1965. Within the occupational categories, 43.3 per cent of the labor force in this census tract was employed in the manufacturing branches, 11.6 per cent in the construction branches, 16.2 per cent in the commerce branches, 7.9 per cent in transportation and communication, and 18.8 per cent of the labor force within civil service types. Also 53.4 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 48.2 per cent of the population was in the ages of 0 to 29 years of age, where as 19.6 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average. Social assistance was, in census tract 403, over the city average. A percentage of 97.4 was for the privately owned dwellings, and 2.6 per cent of the dwell-

ings was non-profit. The data showed that 70.9 per cent of the dwellings was without modern equipment, 13.3 had modern equipment, and 15.5 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 65.9 per cent of the total, where as 28.1 per cent had two rooms and kitchen, and 5.2 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 403 was below the average income.

In census tract 410, 98.6 per cent of the houses was completed before 1940 and 1.4 per cent was constructed between 1941 and 1950. Within the occupational types, 37.8 per cent of the labor force in this census tract was employed in the manufacturing branches, 10.1 per cent in the construction branches, 22.5 per cent in the commerce branches, 9 per cent in transportation and communication, and 19.4 per cent of the labor force within civil service areas. Also 41.9 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 24.7 per cent of the population was in the ages of 0 to 29 years of age, where as 36.1 per cent of the dwellers were 60 years of age and older. The crime rate was over the city average. Social assistance was, in census tract 410, over the city average. A percentage of 63.3 was for the privately owned dwellings and 36.7 was owned by co-operative organizations. The data showed that 2.5 per cent of the dwellings was without modern equipment, 88.3 had modern equipment, and 8.9 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 64.3 per cent of the total, where as 32.4 per cent had two rooms and kitchen, and 3 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 410 was below the average annual income for the city.

In census tract 430, 4.4 per cent of the dwellings was built before 1920, 16.5 per cent was built between 1921 and 1940, and 78.1 per cent was constructed between 1941 and 1965. Within the occupational categories, 37 per cent of the labor force in this census tract was employed in the manufacturing branches, 10.6 per cent in the construction branches, 21.7 per cent in the commerce branches, 10.4 per cent in transportation and communication, and

19.3 per cent of the labor force within civil service areas. Also 50.6 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 37.2 per cent of the population was in the ages of 0 to 29 years of age, where as 16.3 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average. Social assistance was, in census tract 430, over the city average. A percentage of 18.5 was for the privately owned dwellings, 1.2 per cent was for non-profit dwellings, and 80.1 was owned by co-operative organizations. The data showed that 4.7 per cent of the dwellings was without modern equipment, 92 had modern equipment, and 3.1 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 26.2 per cent of the total, where as 52.9 per cent had two rooms and kitchen, and 20.6 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 430 was below the average annual income.

In census tract 302, 99.8 per cent of the dwellings was built before 1920 and 0.2 per cent was constructed between 1941 and 1950. Within the occupational types, 38.6 per cent of the labor force in this census tract was employed in the manufacturing branches, 8.1 per cent in the construction branches, 18.3 per cent in the commerce branches, 8.1 per cent in transportation and communication, and 25.2 per cent of the labor force within civil service areas. Also 52.5 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 43.8 per cent of the population was in the ages of 0 to 29 years of age, where as 22.4 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average. Social assistance was over the city average in census tract 302. One hundred per cent of the dwellings was privately owned. The data showed that 89.9 per cent of the dwellings was without modern equipment, 4.4 had modern equipment, and 5.6 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 40.6 per cent of the total, where as 39.3 per cent had two rooms and kitchen, and 20.1 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. This census

tract was below the average annual income. A picture of census tract 302 is shown in Figure 20.

In census tract 450, 70.8 per cent of the dwellings was built before 1940 and 28.9 per cent was built between 1941 and 1950. Within the occupational categories, 35.7 per cent of the labor force in this census tract was employed in the manufacturing branches, 8.9 per cent in the construction branches, 22.2 per cent in the commerce branches, 11.3 per cent in transportation and communication, and 21.2 per cent of the labor force within civil service areas. Also 42 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 24.3 per cent of the population was in the ages of 0 to 29 years of age, where as 36.6 per cent of the dwellers was 60 years of age and older. The crime rate was below the city average. Social assistance was below the city average in tract 450. A percentage of zero was for the privately owned dwellings, 0.2 per cent was non-profit, and 99.8 per cent was owned by co-operative organizations. The data showed that 0.4 per cent of the dwellings was without modern equipment, 99.3 had modern equipment, and 0.2 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 20.1 per cent of the total, where as 68.4 per cent had two rooms and kitchen, and 11.5 per cent had three rooms or more plus kitchen. The tract was below the city average with overcrowded households. Census tract 450 was below the average income.

In census tract 482, 9.4 per cent of the dwellings was built between 1921 and 1940, and 46.2 per cent was constructed between 1941 and 1960. Within the occupational categories, 39.7 per cent of the labor force in this census tract was working in the manufacturing industries, 8.6 per cent in the construction branches, 13.1 per cent in the commerce branches, 18.9 per cent in transportation and communication, and 14.7 per cent of the labor force within civil service jobs. Also 54.2 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 47.1 per cent of the population was in the age group of 0 to 29 years of age, where as 13.4 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average. Social assistance was, in census tract 482, over the



Fig. 19. Land clearance photo of SS1 area 384 in Södervärn in 1971



Fig. 20. Land clearance photo of SS1 area 302 in Rörsjöstad in 1971

city average. A percentage of 6.1 was for the privately owned dwellings, 6.1 per cent was non-profit dwellings, and 87.9 per cent was owned by co-operative organizations. The data showed that 42.6 per cent of the dwellings was without modern equipment, 46.3 had modern equipment, and 10.4 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 34 per cent of the total, where as 55.5 per cent had two rooms and kitchen, and 9.3 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 482 was below the average income.

In census tract 492, 18.1 per cent of the dwellings was built before 1920, 68.4 per cent was built between 1941 and 1950, and 13.5 per cent was completed between 1951 and 1960. Within the occupational types, 40.9 per cent of the labor force in this census tract was employed in the manufacturing industries, 9.1 per cent in the construction branches, 17.7 per cent in the commerce branches, 9.7 per cent in transportation and communication, and 22.0 per cent of the labor force within civil service branches. Also 56.1 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 44 per cent of the population was in the age group of 0 to 29 years of age, where as 11.8 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average. Social assistance was below the city average. A percentage of 52.7 was for the privately owned dwellings, 4.3 per cent was non-profit dwellings, and 42.9 per cent was owned by co-operative organizations. The data showed that 13.8 per cent of the dwellings was without modern equipment, 76.3 per cent had modern equipment, and 9.3 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 38.8 per cent of the total, where as 51.6 per cent had two rooms and kitchen, and 9.5 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 492 was below the average income.

In census tract 576, 2.8 per cent of the dwellings was constructed before 1940, 65.6 per cent was completed between 1941 and 1950, and 32.3 per cent was built between 1951 and 1960. Within the occupational categories, 46.1 per cent of the labor force in this census tract was employed in the manufacturing branches, 8.9

per cent in the construction branches, 19.5 per cent in the commerce branches, 7.3 per cent in transportation and communication, and 16.9 per cent of the labor force within civil service jobs. Also 53.5 per cent of the women in this tract over 15 years was in the labor force. The demographic characteristics showed that 47.6 per cent of the population was in the age group of 0 to 29 years of age, where as 9.3 per cent of the dwellers was 60 years of age and older. The crime rate was over the city average. Social assistance was, in census tract 576, over the city average. A percentage of 42.8 was for the privately owned dwellings, 12.3 per cent was non-profit dwellings, and 44.9 per cent was owned by co-operative organizations. The data showed that 1.2 per cent of the dwellings was without modern equipment, 82.2 had modern equipment, and 16.5 per cent of the dwellings was without bath. The dwellings with one room and kitchen or less were 27.3 per cent of the total, where as 50.5 per cent had two rooms and kitchen, and 21 per cent had three rooms or more plus kitchen. The tract was above the city average with overcrowded households. Census tract 576 was below the average income. Figure 21 is a picture of this tract in 1971.



Fig. 21. SS1 area census tract 576 in the Limhamn district in 1971

The micro-descriptive picture of the census tracts in Sub-standard one showed that, except for two tracts, the dwellings were old and that the inner physical quality for four tracts was extremely defective in quality. The majority of the census tracts (one excluded) had an over the average crime rate for the City of Malmö. All but two of these areas had over the average for the city in social assistance cases. The high percentage of privately owned dwellings corresponded with the high percentage of without modern equipment dwellings. These census tracts were overcrowded, but there was one exception. Average annual income for Malmö City is assumed to have played a decisive role. This assumption is made because census tract 450 was always one of the above exceptional cases, but it was below the city's average annual income. Many of the dwellings were old but not of bad quality, and there was a rather large per cent of the population 60 years of age and older, which can, perhaps, account for the below average annual income. This tract demands a more detailed investigation. The above census tracts, with probably one exception, quite clearly and reasonably qualified for the Substandard one category in 1965.

Detailed analysis of Substandard two

The census tracts which fell under the category Substandard two showed distinct tendencies. More than 50 per cent of the dwellings in census tracts 204, 304, 305, 311, 312, 320, 321, 330, 340, 350, 360, 361, 362, 363, 364, 371, 373, 374, 380, 382, 383, 385, 390, 391, 400, 411, 423, 483, 484, 490, and 491 was constructed before 1940 (see Figure 22). On the other hand, more than 50 per cent of the dwellings in census tracts 220, 223, 224, 420, 425, 431, 432, 493, 495, 573, 575, 591, 632, 730, 741, 810, 811, 820, 823, 857, 865, and 866 was completed after 1940 (see Figure 22).

With the exception of census tracts 204, 220, 223, 224, 857, and 866 which had under 30 per cent of the labor force employed in the manufacturing branches, the remainder of census tracts under Substandard two had more than 30 per cent of the employed working in the manufacturing branches (see Figure 22).

The women in the labor force were well represented in the second stage. Census tracts 312, 360, 362, 363, and 373 had between 30 and 40 per cent. The remaining census tracts had over 40 per

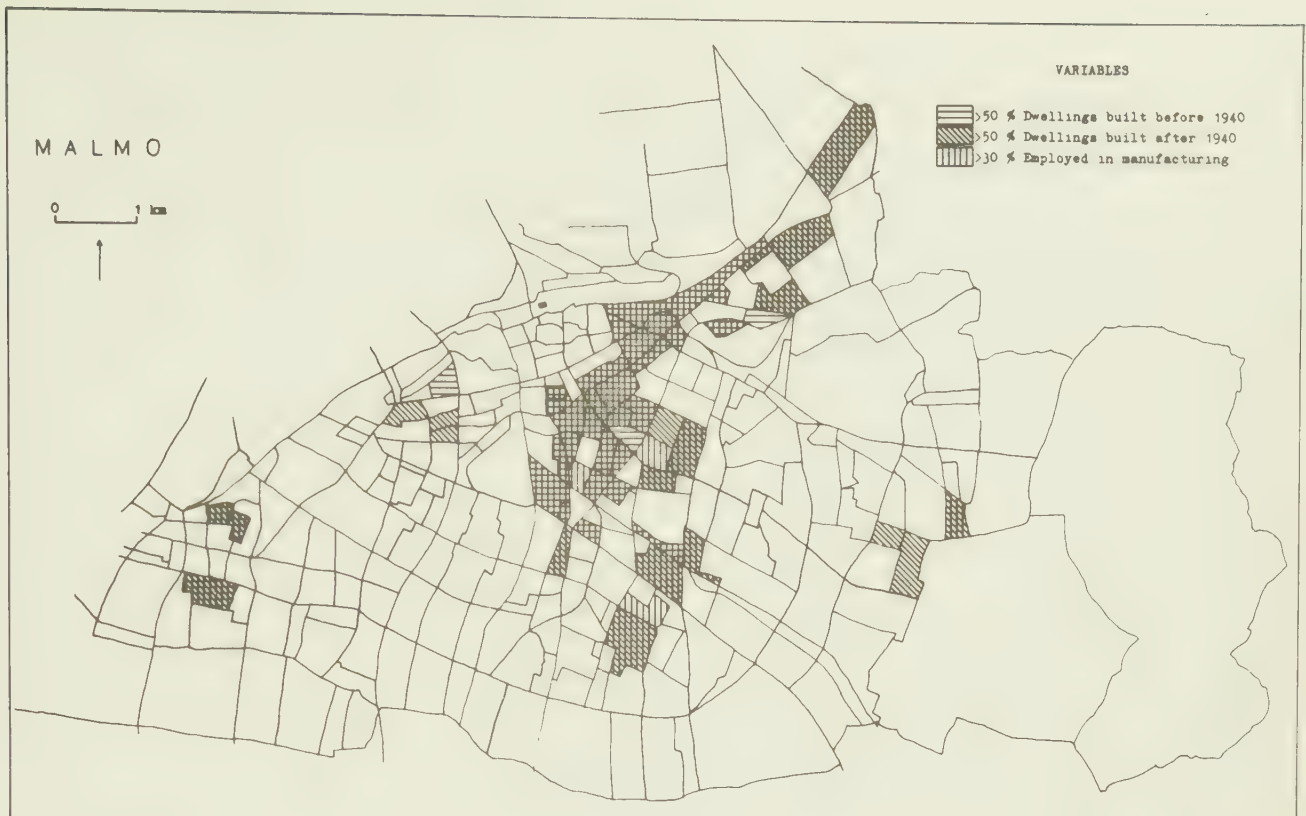


Fig. 22. Census Tracts with Great Percentage for above Variables
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 23. Census Tracts with Great Percentage for above Variables
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

cent of the women regularly employed (see Figure 23).

The age group over 60 years of age had a percentage over 40 in census tracts 312, 362, 363, and 632. The other census tracts had a higher per cent at the other end of the age continuum.

All of the census tracts under this category, Substandard two, had an over the average crime rate in Malmö except for census tracts 363, 390, 391, 400, 811, 857, 865, and 866 (see Figure 23).

Census tracts 204, 305, 311, 312, 321, 330, 340, 350, 360, 362, 371, 373, 374, 380, 382, 383, 384, 400, 411, 420, 425, 430, 432, 483, 490, 730, 741, and 810 were over the city average of social assistance (see Figure 23). Pictures of census tracts 305 and 810 are given in Figures 24 and 25, respectively.

Over 50 per cent of the dwellings was owned by co-operative organizations in census tracts 224, 312, 363, 362, 373, 400, 420, 423, 430, 490, 495, 632, 730, 741, 811, and 820 (see Figure 26). A photograph of census tract 820 is shown in Figure 27. More than 50 per cent of the dwellings in census tracts 425, 483, and 810 was non-profit. In the remaining census tracts under Substandard two, 50 per cent of dwellings was privately owned.

Over 40 per cent of the dwellings within census tracts 304, 305, 311, 320, 330, 350, 371, 374, 380, 384, and 865 was in the quality group called, "dwellings without modern equipment (see Figure 26);" where as 50 per cent or more of the dwellings in the remaining census tracts was in the other quality group called, "dwellings with modern equipment."

The census tracts with overcrowded households were 340, 350, 361, 362, 363, 373, 374, 380, 382, 383, 384, 385, 391, 400, 411, 423, 425, 430, 432, 490, 491, 493, 495, 573, 575, 591, 810, and 811 (see Figure 26). The census tracts under the second stage were all under the average annual income for the City of Malmö.

The same characteristics for the Substandard one category were remarkably high for the Substandard two category but in lesser degrees. One major different is that there was a sizeable amount of census tracts with relatively new dwellings. Such was not the case in the Substandard one category, but there seems to have been a fusion of the first and second stages or a nearness in distance between Substandard one and Substandard two. Nevertheless, most of



Fig. 24. Land clearance photo of SS2 area census tract 305 in the Södra Förstaden district in 1971



Fig. 25. SS2 area census tract 310 in Persborg area of Södra Förstaden in 1971



Fig. 26. Census Tracts with Great Percentage for above Variables
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 27. SS2 area census tract 820 in Segevång a sub-district in Östra Förstaden district in 1971

these census tracts were located in the districts of the City of Malmö where there was a strong concentration of old building structures.

Detailed analysis of the Potential zone

Under the Potential zone, studying the characteristics in more detail, it is found that six census tracts had over 50 per cent dwellings built before 1940 (see Figure 28), but census tracts 562 and 563 had more modern dwellings with 50 per cent built after 1940 in the Limhamn district. All of the census tracts under the Potential zone in the Limhamn district had more than 30 per cent of the employed working in the manufacturing branches. The other occupational types had basically the same percentage as in the second stage above. Women in the labor force in these census tracts had approximately the same percentages as the second stage. There was nothing extraordinary in the age groups when compared with Substandard two. Only census tract 560 was above the crime rate average, but none was over the social assistance average. Over 50 per cent of the dwellings was privately owned. Census tracts 562 and 563 were the only two that had less than 40 per cent non-modern equipment in the Limhamn district. The majority of the dwellings is of a "two rooms with kitchen" format. Census tracts 553, 562, 563, 572, and 580 were overcrowded. The census tracts were below the city's average annual income.

In census tracts 620, 621, and 630 in the Pildammsstaden district, the dwellings were built after 1951. Approximately 29 per cent was employed in the manufacturing branches, 24 per cent in commerce, and 25 per cent in civil service branches. More than 45 per cent of the women was employed. Over 45 per cent and under 6 per cent were in the age groups 0 to 29 years of age and over 60 years of age, respectively. In census tract 621 the crime rate was over the average, and in 620 social assistance was over the average. In 620, 75 per cent of the dwellings was non-profit and 25 per cent was owned by co-operative organizations; in tract 621 (see Figure 29), 51 per cent was non-profit and 49 per cent was co-operative; census tract 630, 86.4 per cent was owned by co-operative organizations and 13.6 per cent was privately owned. The dwellings in these census tracts had 100 per cent modern equipment. Over 50 per

cent of the dwellings was two rooms or more and none overcrowded. They had approximately average or below average income.

In census tracts 721, 722, 731, and 753 in the Fosie district, more than 99 per cent of all dwellings was built between 1961 and 1965. Over 40 per cent was employed in the commerce and civil service branches, and more than 45 per cent of the women was in the labor force. Over 60 per cent and below 5 per cent of the population were in the age groups 0 to 29 years of age and over 60 years of age, respectively. Census tracts 721, 731, and 753 had over the average in crime rate, and 731 and 753 were over the average in social assistance. Approximately 99 per cent of the dwellings in census tracts 721 and 722 was owned by co-operative organizations, 100 per cent in 731 was privately owned, and in 753 the dwellings were 100 per cent under the non-profit category. The dwellings had about 100 per cent modern equipment. Over 70 per cent of the dwellings was two rooms with kitchen or more and none overcrowded. The census tracts were below average in income during 1965.

In census tract 800 in the Rosengård district, 100 per cent of the dwellings was built between 1961 and 1965. Approximately 40 per cent worked in the commerce and civil service branches, and 48.5 per cent of the females was in the labor force. Over 60 per cent and below 3 per cent were in the age groups 0 to 29 years of age and over 60 years of age, respectively. The crime rate was over the average in this census tract and above the average in social assistance. One hundred per cent of the dwellings was non-profit, and 99 per cent was of modern equipment. Over 90 per cent of the dwellings was two rooms or more with kitchen, but the dwellings were not overcrowded. Census tract 800 was under the average income. There is a picture of this tract in Figure 30.

In census tracts 201 and 202, over 80 per cent of the dwellings was built between 1941 and 1965, and in 210, one hundred per cent was built before 1940. Over 50 per cent was employed in the commerce and civil service branches. More than 37 per cent and 14 per cent were in the age groups 0 to 29 years of age and over 60 years of age, respectively. In tracts 201 and 202, the crime rate was over the average; 201 was above the city's social assistance average. Over 90 per cent of the dwellings was privately



Fig. 28. Land clearance photo of a P-zone area census tract 100 in the Gamla Staden district in 1971



Fig. 29. P-zone area census tract 621 in Lorensborg a sub-district in the Pildammsstaden district in 1971

owned in 201 and 202, but 100 per cent was non-profit in 210. Census tracts 201 and 202 were over 90 per cent in modern equipment, and 210 had 79 per cent non-modern equipment. Census tract 210 was overcrowded, and it was below the average annual income.

The census tracts in the Potential zone category were just below the standard for Malmö City. The age of the structures carry lesser weight, where as other elements such as the crime rate and income play an important role in this stage of development. Here again, there seems to have been a fusion from Substandard one to Substandard two and in to the Potential zone. The Potential zone was always in the nearness of the Substandard one and Substandard two census tracts.

In the above cases, a selection of some of the older tracts and newer tracts were studied in detail instead of studying each individual tract as was done for Substandard one and two. Particular attention was given to the census tracts located outside of the central area of Malmö. They were composed mostly of recently constructed houses.

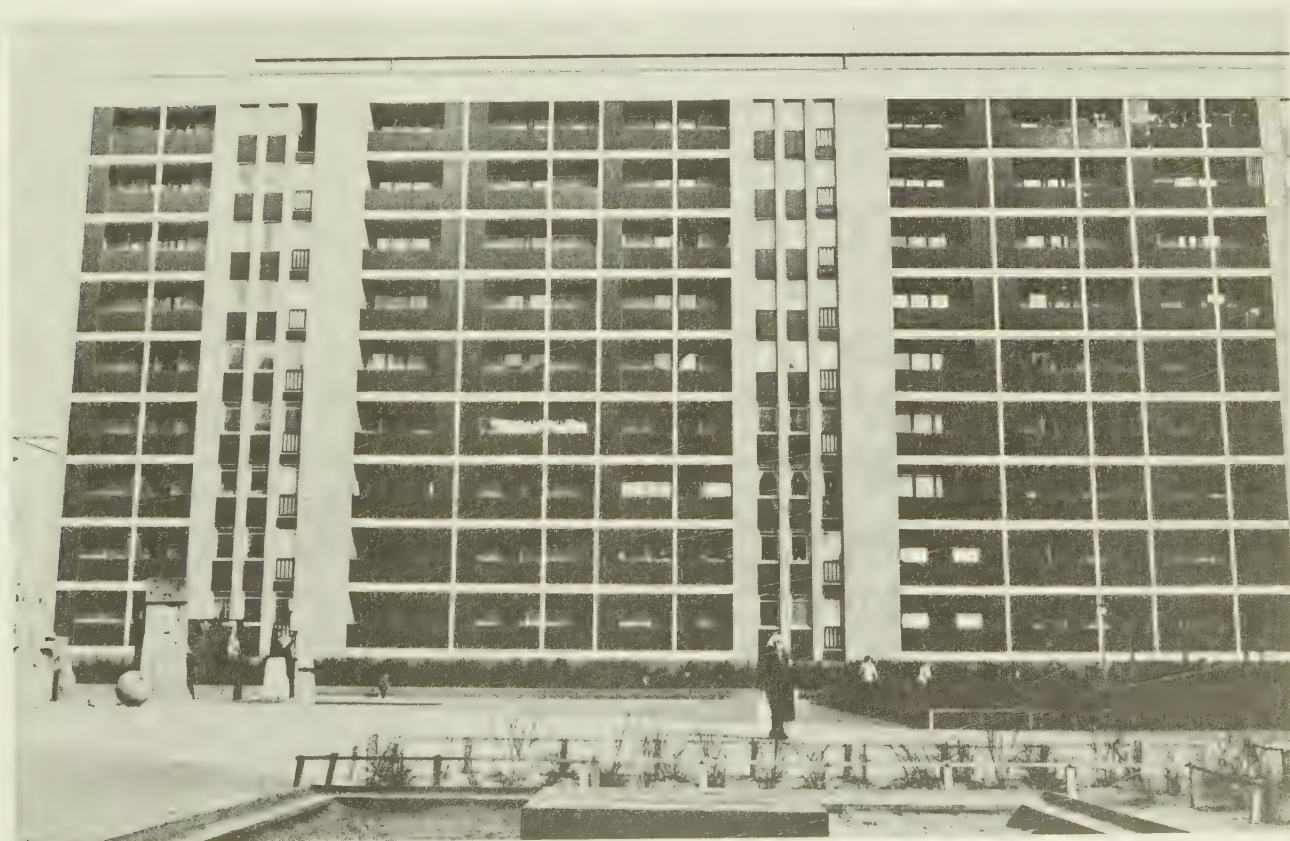


Fig. 30. P-zone census tract 800 in Rosengård district in 1971

After treating the SSA by studying the census tracts of the three SSA categories in detail and the relationship of specific variables, which were used in the factor analysis, within these three spaces, there is a tendency which displays that a great number of the SS1 and SS2 census tracts is located most frequently in the older districts of Malmö. Many of the dwellings in these districts were built before and during the turn of the century. It is quite natural that the living standards do not quite meet today's requirements. With the exception of Gamla Staden, the P-zone census tracts are situated in districts where a large proportion of the dwellings was constructed after 1940. As mentioned earlier, the SS1 tracts tend to be clustered and enclosed by the SS2 tracts, where as the P-zone tracts are surrounding the SS2 tracts (see Figure 17).

CHAPTER VII

THE SPATIAL ASPECT OF RESIDENTIAL DIFFERENTIATION

The spatial aspect of residential differentiation in relation to the background which creates these differences will be synthesized in this section. The first part of this chapter deals specifically with the ecological theories in relation to Malmö. The second part treats the basic blocks to the foundation of residential differentiation, which are economic and social components, and reflects upon how these blocks are considered within the Malmö frame regarding the SSA stages.

The Classic Ecological Theories

How valid and reliable are the classic ecological models? Are the validity and reliability of these models sound enough to apply to all cities, and if so, how do the models fit Malmö's urban structure? The task here is to discover how the models are suitable for describing the spatial structure of Malmö with reference to the factor score maps and SSA maps in Chapter V and Chapter VI, respectively.

The concentric zonal model and Malmö

This first section will examine the definitions of the zonal segments and will render a critical analysis of these segments in relation to Malmö. The first zonal segment mentioned by Burgess, the originator of the concentric zone model, is the central business district (CBD).¹ It is usually composed of the city's highest buildings where many of the city's offices are located and in which most of the larger retail stores are situated. The functions of

¹See Ernest W. Burgess, "The Growth of the City," in Robert E. Park et. al. (Eds.), The City. (Chicago: The University of Chicago Press, 1925).

the CBD are the following: business functions, culture and education functions, recreation and related activities, government functions, and a limited residential function.² The CBD may be looked upon as a transportation magnet for the remaining city because a large per cent of the transportation devices and city population enters into the CBD at some time period during the day. The preceding statement holds true for a large city in the 1920, but since that time, large shopping centers have developed in scattered parts of the rapidly growing city causing people to have a lesser need to enter the CBD.

The values of land in the CBD are extremely high. The theory of urban land values is the foundation upon which the zonal model is built. From the economic rent theory in agriculture presented by von Thünen derived, in 1903, the urban land values theory by Richard M. Hurd. Hurd assumes that value depends on the nearness to the center of the city. He gives sequential steps of dependence: land value depends on economic rent; economic rent depends on location; location depends on convenience; convenience depends on nearness.³ Hurd gives no mention to residential land per se.

The second concentric circle has frequently been called 'the zone in transition.' As the CBD grows, the once pleasant residential areas become infiltrated with small factories and other institutions or facilities which cause residential areas to deteriorate. This zone is renown for its high criminal rate and apartment owners who demand rents from the dwellers that are not equated to the low standard of the dwellings. There are not many children but a large number of older people presiding in this zone. In the ethnic ghettos of this zone are found large numbers of children. The transition is typified by mixed land use, aging structures, general instability, and change, and by a wide range in type and quality of functions.⁴

²See Gerald Breese, "The Daytime Population of the Central Business District," in E. W. Burgess and Donald J. Bogue (Eds.), Contributions to Urban Sociology. (Chicago and London: The University of Chicago Press, 1964), p. 115.

³Richard M. Hurd, Principles of City Land Values. (New York: The Record and Guide, 1903).

⁴Richard E. Preston, "The Zone in Transition: A Study of Urban Land Use Patterns," Economic Geography, Vol.42, No. 3 (July, 1966), p. 236.

The third concentric zone is called 'the working men's homes' zone. This zone is composed of citizens who are employed in the factories and small shops which are generally located near-by. These people have shifted residences from zone two to zone three because of the stress and strain of living in 'the zone in transition.' The costs of living are usually low, and the accessibility to the places of employment is often favorable. Today, the worker's major means of transportation are the automobile and city transit because places of work have shifted outward.

The concept 'residential zone' was attached to the fourth concentric zone. This zone consists of an abundance of privately owned single-family houses and rather expensive apartment houses. Small shopping districts are dispersed in different areas of zone four, which resemble the CBD's more exclusive shops in miniature.

The fifth concentric zone is called 'the commuter's zone.' This zone comprises the suburban areas and satellite cities. It is a travelling time between 30 to 60 minutes to the central business district.⁵ The concentric zones can be extended farther, but for purposes of this study only five zones are being treated.

In accordance with the brief but concise above definition for the concentric zonal model, the intention is to examine this definition to determine how well it fits the structure of Malmö. The original core of the city can be called zone one or the CBD of Malmö. The CBD has a radius of a half kilometer from the geographic center (see Figure 31). This area has the majority of the highest and most densely built buildings in the city. The largest number of the city's offices of all types is located here. The largest retail stores or department stores are situated in the CBD of Malmö which is familiarly known as Gamla Staden.

Within the main business functions there can be found the home office of the different banks of the city, many large department stores, largest hotels, and other commercial facilities. Culture and education functions are located outside Malmö's zone one. Many of the city's recreation and related functions are found here.

⁵Burgess, "The Growth of the City," loc. cit., pp. 47-62.



Fig. 31. Concentric zones in Malmö
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

The largest cinema houses, the expensive and exclusive dinning halls, restaurants, and nightclubs are here, where as the activities, such as, sport events, physical fitness facilities, etc., are situated outside the CBD. Most of the governmental functions are located here. The Provincial Governor's Residence and office, the County Court House, the County's Chamber of Commerce, and approximately thirteen Consulates of different countries are situated in the CBD of Malmö. Despite the high rise buildings, only 2.2 per cent of the city's population resided in the CBD indicating a limited residential function.

The city's central railway station is located in zone one, which facilitates the many working and shopping commuters from surrounding towns, communities, and villages. Malmö's highest land values are found in the CBD. The structure of the CBD in Malmö has the same image as most CBD's in the world's cities. As a result, the above definition for zone one holds true for Malmö.

The transition zone or the second concentric circle in Malmö has transformed considerably due to the expansion of the CBD. Big industry and wholesale facilities are in this zone. Many of the areas in this zone that were once pleasant residential areas have been infiltrated by small businesses and factories and other institutions and facilities which generally cause residential deterioration. It is prevalent that a high degree of exploitation by owners of the low standard and poorly conditioned dwellings is carried out against their, in many cases, financially handicapped tenants. This exploitation is done in the form of high rent for small and low standard apartments. There are areas in this zone where criminality, as previously defined, is exceedingly high in comparison to other areas in Malmö. The number of children in zone two is relatively low, but older age groups and some of the senior citizens of the neighborhoods continue to reside there.

'The working men's home's zone' is concentric zone three (see Figure 31). One of the major features of this zone is that those who live in the different areas of this zone are generally employed in the small neighborhood shops and factories located nearby. This is basically not the case in zone three in Malmö. According to Burgess' definition, this zone cannot realistically be called

'the working men's homes' zone in Malmö. In this zone, in Malmö, the residential areas are not specifically compounded with factories and small shops but are residential areas within themselves. The working population in zone three must use other means of transportation in order to come to the place of employment which is usually not located nearby. The citizens make the residential move to newly developed high rise apartment areas which are usually not low in cost and not directly accessible to the work place.

As a rule, it is not the stress and strain of the transition zone that have coerced the citizens to move into zone three, but they seek more suitable dwellings. There are other areas in zone three which have high valued single family dwellings with suburban type surroundings (milieu).

Zone four or the residential zone in Malmö can very well resemble the description of that presented above. There are many areas in this zone with privately owned single-family dwellings, but the apartment houses are equally as expensive as apartments of the same age in the other zones. The above definition mentions that the apartments are expensive. In some of these areas there are many branches of the larger department stores which are located in the CBD. The quality of the shops are basically the same in every district regardless of the exclusiveness of the residences in the areas.

The commuters' zone or zone five to a great degree circles outside the Malmö City limits. Much of this zone is rural, agricultural land use. Zone five is often called the suburban zone which is composed of many single-family homes. This characterization is nonexistent in Malmö because of the negative attitude by the city government to urban dispersion à la American cities, for example. Burgess called zone six 'the agricultural district' which sufficiently characterizes zone five in Malmö.

The sector model and Malmö

Homer Hoyt's point of departure for the construction of his sector theory is that residential areas move in distinct outward patterns in different sectors of the city. The 'measuring stick' is based on rent rates.⁶ There are five sectors used for describ-

⁶Homer Hoyt, "The Structure and Growth of Residential Neighborhoods in American Cities," Federal Housing Administration, (1939), pp. 117-119.

ing the structure of a city. These are: sector one, the central business district; sector two, industrial area; sector three, low value residential area; sector four, medium value residential area; sector five, high value residential area.

The sector model is more realistically suitable for the structure of Malmö than the concentric zone model because the structure of Malmö is composed of different types of sectors around Gamla Staden. The central business district is basically the same for both models (see Figure 32). The Malmö sectors are drafted from Figure 9. Sector two, the major industrial area, stretches out radially from the CBD along the coastal front and railway and major highway of the city. There are patches of industrial areas located in other sectors, except the high value residential sectors of Malmö.

Sector three or the low value residential area also exhibits a distinct pattern outward from Gamla Staden (CBD) to a certain degree but is eventually hindered from further radial expansion by newly built-up residential districts. The medium value residential area or sector four gives a visual impression of enveloping the low value areas by surrounding them and expanding radially outward from their boundaries. Here again, there are some patches of sector three in the medium value sectors.

The high value residential areas (sector five) are extremely sparse in Malmö as well as most cities in the world. Sector five branches out from the CBD in a radial southwestern direction along a desirable and scenic coastal front. Nearest the central business district, there is a mixture of low and high value residences, followed by a continued growth of high value residential areas. Sector three, a low value area in Limhamn, is eventually engulfed in the outer region of this high value sector. Limhamn was a small satellite town that was eventually incorporated by Malmö. Sector four is attached to these high value areas. To the east of the CBD surrounded by sector four is found another high value residential area. The values here are not as extremely high as those values of residences in the southwest sector but are higher than in sector four. There is some mixture of medium value residences in this area which is located very near the city's airport (see Figure 33).



Fig. 32. Sectors in Malmö
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 33. Land use map of Malmö City: 1965
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

The multiple-nuclei theory

The multiple-nuclei theory is the third theory of urban growth presented by C. D. Harris and E. L. Ullman.⁷ It will be briefly treated here because there are endless amounts of material explaining the theory. Its point of departure is not constructed upon an original single city core but tends to develop from several district nuclei. This is the major difference between this model and the other two mentioned above. On the other hand, the multiple-nuclei theory is an offspring of the others and, as a result, will not be utilized here.

Criticisms of the zonal and sector theories

First, some consideration must be given to the main objectives and goals of these theories. They were originally urban growth theories. Burgess constructed an ideal or theoretical model for a city with a large, heterogeneous, and rapidly increasing population, where private ownership of property competition and lack of city planning exist and transportation is cheap easy, and rapid in every direction.⁸ Automobiles and distant suburbia were not regarded. As oppose to Burgess' theoretical model, Hoyt's model was constructed as an experimental model for practical purposes, but the assumptions are basically the same as for the zonal model given above. The two inventors had cognizance of over-simplification and generalization in their models. For the zonal model, emphasis is based on family structure or family factors. The sector model bases its emphasis on rental values or socioeconomic factors.

Now that these distinctions have been made, the major criticisms can be treated with more consideration to the aims of the models. In the zonal model it is not clearly explained that within these homogeneous zones there are different types of population and land use that characterize, for example, zones one and two.⁹ There

⁷See Harris and Ullman, "The Nature of Cities," in Mayer and Kohn (Eds.), Readings in Urban Geography. (Chicago: The University of Chicago Press, 1959), pp. 277-286.

⁸J. A. Quinn, Human Ecology, (New York, 1950).

⁹Ibid., pp. 116-137.

is no distinct demarcation of the zones from each other and an absence of consistency in the family type distribution.¹⁰

It is implied in the sector theory that the pattern of growth in a city is determined by the attraction of the leaders of society. Similar to the criticism given for the zonal model, the definition for sector is extremely ambiguous. There is no concise definition for medium value residential area, and there is no discussion about the stratification and spatial distribution of the social groups.¹¹

Despite the criticisms and vagueness of the zonal and sector theories, they have been fruitful and useful for gathering more insight about the growth and structure of cities.

The spatial structure of residential Malmö

Which of the two spatial models is most suitable to Malmö? One can closely identify zonal theory's zones one and two with Malmö's CBD and zone two. Zone one in Malmö is called Gamla Staden where Malmö's big business is located. In the Södra Förstaden, Söfielund, Möllevången, and Kirsebergsstaden districts which are characterized by residential deterioration, high crime rate, and where most of the SS1 areas are located can be exemplified in zone 2 of Burgess' model (see Figure 31). Integrated into Malmö's zone two are characteristics of zones three and four of the original model. The other zones of Malmö do not present the identical picture of the zonal model. There is great concoction in the types of characteristics in the zones of Malmö. There are no distinct patterns as mentioned by Burgess in the remaining theoretical zones. In fact, there is found a vague pattern of small and old families living in and nearest the CBD or zone one. With increasing distance from the CBD and zone two the size of the family increases but not in a clear and concentric pattern. These large families are found in both single-family dwellings as well as large high rise apartment residential areas somewhat remote from the CBD. It should be explicit to the reader that the spatial patterns are the results of the factor score map (see Figure 8). A comparison between that map and the concentric zone model was made.

¹⁰M. A. Alihan, Social Ecology, (New York, 1938).

¹¹Duncan Timms, The Urban Mosaic, (Cambridge: The University Press, 1971), p. 228.

The sector model is the most suitable for describing the spatial structure of Malmö. There are very distinct or specific patterns of radial expansion from Gamla Staden in the different sectors described by Hoyt. In the case of Malmö the socioeconomic factors have replaced the high rental values utilized as a measurement by Hoyt. Sectors one (Gamla Staden) and two (the Eastern and Western Harbor areas for industry) in Malmö are the same as defined in the original sector theory. Sector three, which includes much of Östra Förstaden, Rörsjöstaden, Mellersta Förstaden, Södra Förstaden, Möllevången, Sofielund, and Södervärn, is an extension of the CBD and characterized by low value residences with high residential deterioration. Most of the SS1 and SS2 areas are located in the districts mentioned above. The reader must keep in mind the history about the expansion of Malmö that these areas were settled during the last half of the 1800s so that the possibility of physical ruination is great. One hundred per cent of the above mentioned districts are not completely deteriorated residential areas. On the contrary, there are found high and medium value residences in these districts.

Sector four, in many cases, is an extension of sector three and in most cases is adjacent to sector five (see Figure 32). Figure 32 was constructed according to the factor score map in Figure 9. The medium value residential area or sector four is vague here. There is much socioeconomic heterogeneity in sector four of Malmö. For example, many of the city's SS2 and P-zone areas are situated in sector four. This sector has the greatest spatial distribution in the city. The high value residential area is a radial pattern from the CBD expanding outward in a southwestward direction. A patch of sector five is located directly due east from Gamla Staden.

Deviating somewhat from the basic sector theory, a more vivid description of the real spatial structure of Malmö is envisioned than when attempting to describe Malmö's spatial structure with the zonal theory (see Figure 32).

Gamla Staden underwent a tremendous construction of several storey buildings between 1870 and 1910 which replaced the one storey housing previously situated there. This concentration of building in the city center continued until after the World War I period.¹²

¹²Olle Swedberg, "Malmö Innerstad: Byggnadshistorisk Inventering," (unpublished paper, Malmö, 1970), pp. 20-36.

Södra Förstaden had its greatest development of houses during this period as well. The largest expansion of housing in the Möllevången and Rörsgästaden districts was between 1890 and 1910. Between 1880 and 1910, Sofielund's large number of houses was built. The bulk of housing construction in Östra Förstaden took place between 1890 and 1930. In presenting the historical development in the districts where the SSA has its dominance, the old age of the dwellings can possibly account for the high residential deterioration in 1965.

The Foundation for Differentiation of Residential Areas

Preference of residential location, flow of information, family status, socioeconomic status, and residential desirability are the five economic and social components to the foundation for the differentiation of residential areas. These components will be discussed in this section.

Economic and social components

The financial state of the individual or households plays a decisive role as to the preference of residential locations. "Costs are associated not only with the price or the rental of house and land, but also with their location relative to work and service places and to other locations which it is desired to visit."¹³ The inhabitants with the highest degree of choice are the ones with the largest capital. Consequently, the degree of choice decreases as income or capital diminishes.¹⁴ "Today, while the rich live in the suburbs on cheap land, the poor live in the residential area nearest the central business district (CBD) on land of somewhat higher value. Whether a family is rich or poor its budget is divided between (1) living costs; (2) housing costs; and (3) travel costs. After living costs are deducted from income, an allocation is made between housing and travel. Inexpensive housing, usually smaller and older units, is concentrated near the downtown area where the rentals per unit of land are high, and where net outlay per square

¹³Timms, op. cit., p. 118.

¹⁴James W. Simmons, "Changing Residence in the City," The Geographical Review, LVIII, No. 4 (October, 1968), pp. 632-651.

meter of living space is high as well. Yet this is still the cheapest place to live, mainly because living space can be purchased in small units."¹⁵ The above statement is an oversimplification because living costs and housing costs bear the same weight when deducting from income, especially among the poor. Perhaps in time, the bulk of the original economic center of gravity or the core of the city will shift to the fringes because of the congested and cumblesome city. With the steady development of scientific technology, it may be discovered that it is more economically advantageous to move the major financial interests from the core which would probably reduce the value of land in and near the original city center.

Timms contends that the differentiation of residential areas is caused by many decisions in relation to the area's characteristics and the location of the dwellings.¹⁶ "It may be added that it is not only families moving up the occupational ladder, or who are particularly 'status-conscious,' who are likely to be sensitive to the prestige aspects of location." Timms continues with the argument that a very effective device to determine a person's physical as well as his social space is by means of his address.¹⁷ Three important entities of location are the social environment (nearness of friends and institutional amenities); the physical environment (quiet, maintenance, and design); and access to the city as a whole or to places of work.¹⁸ Wirth considers density, land values, rent, accessibility to work place, favorable environmental conditions (such as, lack of smoke, dirt, and noise), prestige, and aesthetic consideration as factors effecting residential location.¹⁹

In today's Sweden, many of the dwellers can exercise their individual rights to obtain the above aspects without greatly facilitating the strict socially stratified residential differentiation. Each citizen has the possibility to get a federal loan with a rela-

¹⁵Ronald Abler, John S. Adams, and Peter Gould, Spatial Organization, (Englewood Cliffs: Prentice Hall, 1971), p. 358.

¹⁶Timms, op. cit., p. 95.

¹⁷Ibid., p. 99.

¹⁸Simmons, op. cit.,

¹⁹Wirth, op. cit., p. 15.

tively low cash down but on a long term basis. The cities do not easily appropriate land for single-family housing which causes a long waiting list for such housing. Apartment housing is not built for specific social class groups.

Meyer has composed three components of the environment of a residential location taken from numerous other studies dealing with the same subject. "These components are: dwelling characteristics, neighborhood characteristics, and relative location with respect to the household's movement pattern."²⁰ Timms, Simmons, Wirth, and Meyer are in complete agreement as to the causes of residential location. The explanation for residential location mentioned above and in turn its cause to residential differentiation, with some alterations, fit the pattern of Swedish cities like Malmö.

In systems like those in most western nations where private capital and governmental planning go hand in glove, the choice of residential location can be extremely important. How important is private capital in relation to residential choice in nations where governmental bodies have strong control over planning and individual capital is a lesser decision making device? In a Swedish city the size of Malmö, the city government has the last voice on how the land should be utilized. In this case the economic factor in the choice of residential areas has a lesser effect.

Generally, the mental picture of the choice of the area of residence might possibly be equated, in reality, with an economic frame of reference. In Malmö the SS1 areas can be considered as the areas of minimum choice where the chance to choose is cut to a minimum. It is not an absolute truism that economic capital is the basic decision maker in the choice of the area of residence because in some cases the blue collar workers with incomes higher than many of the low income civil service workers choose a lower grade of residential areas than their counterpart.²¹

²⁰David R. Meyer, Spatial Variation of Black Urban Households, (Chicago: The University of Chicago Press, 1970), pp. 13-16.

²¹Peter G. Goheen, Victorian Toronto 1850 to 1900, (Chicago: The University of Chicago Press, 1970), p. 128.

The flow of information, like the preference of residential location, is another component that is vital to the formation of residential differentiation. Pred contends that there are three types of information fields, private information, public information, and visual information, to which an individual has access.²² Which one of the three fields of information plays the strongest role is difficult to establish. In most nations, especially western nations, personal contacts, the mass media, and different types of agencies are the major channels in which information about unoccupied housing flows. Personal contacts have their social influences. Information fields are greatest in the surroundings of a group of individuals which shares social rapport, but the information fields decrease as the introversion of individuals increase.²³

In essence, individuals from the same social classes usually spread information among each other. Newspapers and other media provide information of vacancies for a very select population which tends to be social stratum oriented.²⁴ There are housing agencies of different types which arrange contacts for certain social groups and have great influence on how the differentiation of residential areas is structured.

In Sweden most of these private agencies function as housing co-operatives, and the social status of the members is of less importance than in other nations. In Malmö, as well as most other Swedish cities, there is a local housing authority which is controlled and operated by the city and which is a non-profit organization. Today, unlike in other western countries, this authority should have the most influence over the differentiated structure of residential areas because of its rigid control of vacancies and its democratic procedures of informing applicants without regard to social position. Still, the private owners of some dwellings have enough power to reduce the complete effectiveness of the local

²²Allan Pred, "Behavior and Location," Lund Studies in Geography, Series B, No. 27 (1967), pp. 33-34.

²³Ibid., p. 37.

²⁴Timms, op. cit., p. 117.

housing authority.²⁵

Family status is an essential component. Differentiation of residential areas can possibly be an end result of the family life-cycle and life style. As the family grows which causes changes in the size or composition, the needs and desires for more physical space become more prevalent, and this in turn has some effect upon the style or function of the family. "To the extent that houses in different parts of the city have differential appeal to families at varying stages of the family cycle then the very existence of the latter will lead to a differentiation of the city fabric in terms of family characteristics."²⁶

In most western nations the attraction of families with young children toward the suburban residential areas is both social and physical. There is the search for pleasurable environment and more spacious living. As distance from the CBD increases the size of the family also increases.²⁷ This is not universal because in cities where there is a great degree of discriminatory practices against ethnic or religious groups one can find many large families concentrated near the CBD. Malmö has a similar directional pattern mentioned by Goheen but in a unique way. The size of the families increases as the distance from Gamla Staden increases, but Malmö lacks suburbs because of such an extended city boundary. Here, the definition for suburbs is an abundance of separately incorporated cities surrounding a large city and immediately outside the city limits. There are only a few one-family flat residential areas because of high value land costs. Most of the city's residential land is used for high rise apartments. This in some respects decreases distinct social rank in differentiated residential areas.

Still, another component is socioeconomic status. Variables that form the socioeconomic status are income, occupation, and a few other variables. There is a strong social class differentiation in most urban places. It is a general and accepted assumption that once the socioeconomic status of an area changes, that the

²⁵Göran Lindberg, Urbana Processer, (Lund: Bröderna Ekstrands Tryckeri AB, 1971), pp. 133-154.

²⁶Timms, op. cit., p. 117.

²⁷Goheen, op. cit., p. 207.

social strata of the area follow the same trend.²⁸ This must be treated with caution if used as a measurement in relation to residential differentiation. In general the address does depict much about the individual's socioeconomic status. High socioeconomic status seems to equate with power, and individuals in this social stratum are in decision making positions which have a strong effect on how the residential areas are differentiated. In Malmö it is distinctly shown that the high socioeconomic status areas are at farther physical distances from the CBD than the low socioeconomic areas. This is in keeping with many previous studies that have been performed on this subject.

Residential desirability is the fifth component. Residential desirability might depend on the perception and evaluation of the area in which one lives as mentioned by Peter R. Gould.²⁹ A "perception surface" study was performed in Malmö. Questionnaires were given to approximately 300 school children from six different schools in the last class of compulsory school, sixteen years of age, and 300 adults from the same six school districts in which the schools are located. These 600 participants from the 6 areas were randomly selected. The school districts were selected according to the different physical and social structure of the school districts. There were sixteen areas from which the participants should select in rank order the area of residential desirability. Only the first choices of the desired and undesired areas of each individual were taken into consideration. Maps were produced for each school and district presenting the percentages for the areas most desired and least desired (see Figure 34). Areas 1 and 2 of the sixteen areas are considered in the PS1 district. Percentages less than five show a low degree of desirability or undesirability on either end of the continuum and as a result were not entered into the maps.

The pupils and the adults in Kirseberg School (PS1) district demonstrate that they desire living in the area from which they come. The Segevång area (1) which is adjacent to the Kirseberg area (2), where the school is located, falls within the highest percent-

²⁸Simmons, op. cit., p. 631.

²⁹Peter R. Gould and R. R. White, "The Mental Map of British School Leavers," Regional Studies, Vol. 2, No. 2 (November, 1968), pp. 161-182.

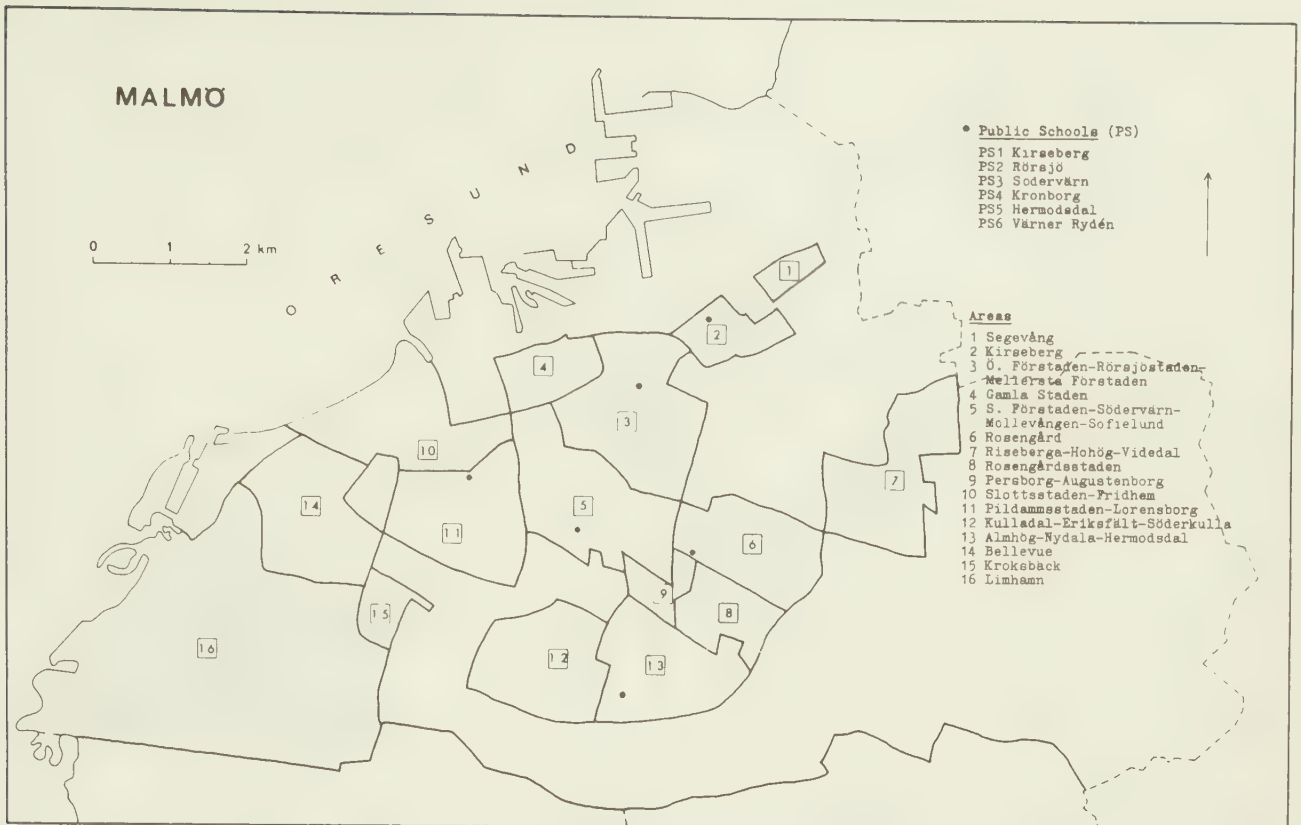


Fig. 34. Location map
(Approved for distribution by Rikets Allmänna Kartverk, 1972.06.26.)

age range (see Figures 35 and 36). This school district is composed of most SS1 and SS2 census tracts discussed above. The Limhamn area (16) about eight kilometers southwest of Kirseberg School is very desirable as well as the Riseberga, Hohög, and Videdal area (7) which gets a position in the middle class interval. Östra Förstaden, Rörsjöstaden, Mellersta Förstaden area (3) is desired by the pupils. The adults selected Slottsstaden-Fridhem area (10) as highly desired. Areas 7 and 16 are also desired. The Rosengård and Rosengårdsstaden, (6) and (8) respectively, are areas least desired according to pupils and adults in the Kirseberg area. Kirseberg School is situated in a SS1 area.

The Rörsjö School (PS2) children and adults in that area desire very strongly to reside in area 3 where the school is located. This area is situated somewhat west of Kirseberg (see Figures 37 and 38). The neighboring Gamla Staden area (4) and Limhamn have a declining degree of desirability of the middle class interval and lower class interval for pupils and adults, respectively. Pildamms-

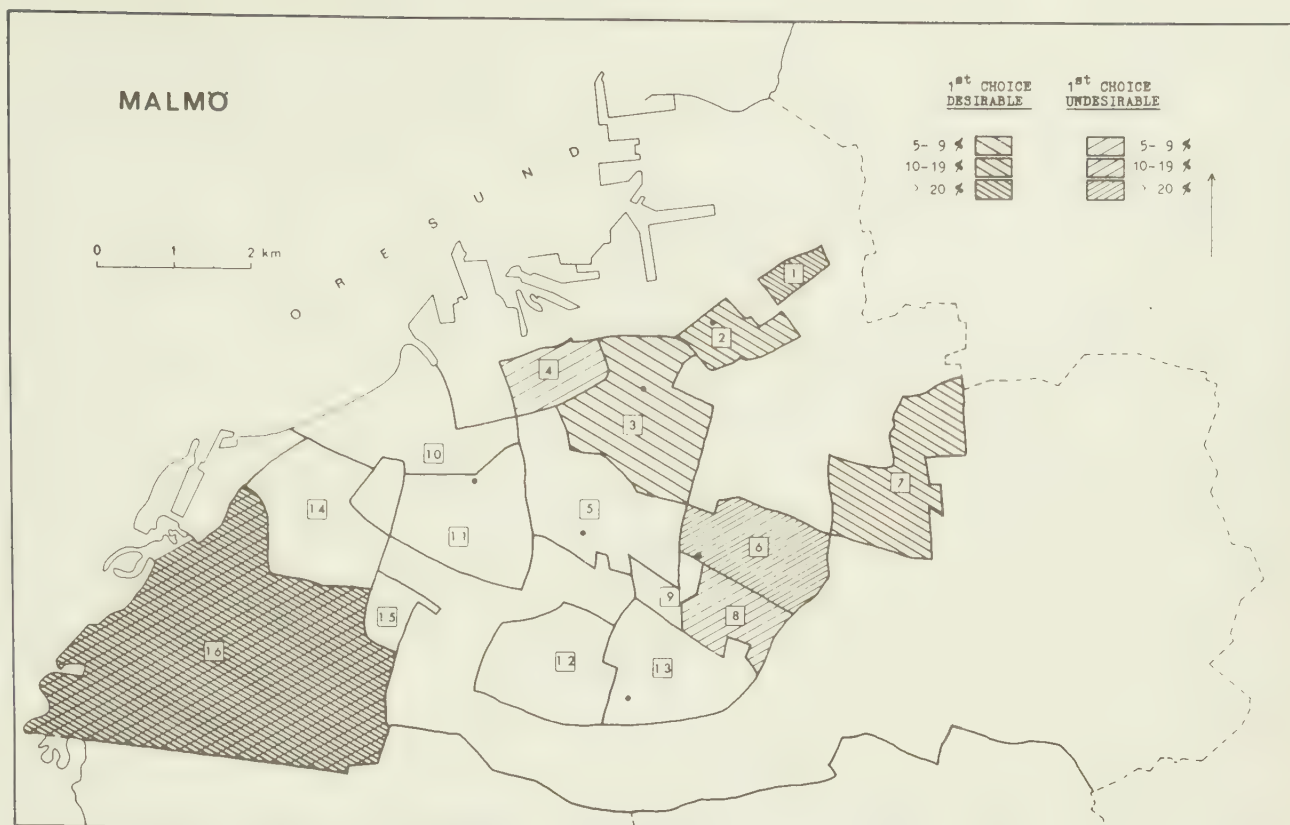


Fig. 35. Residential desirability for Kirseberg School children
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 36. Residential desirability for adults in Kirseberg School area
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

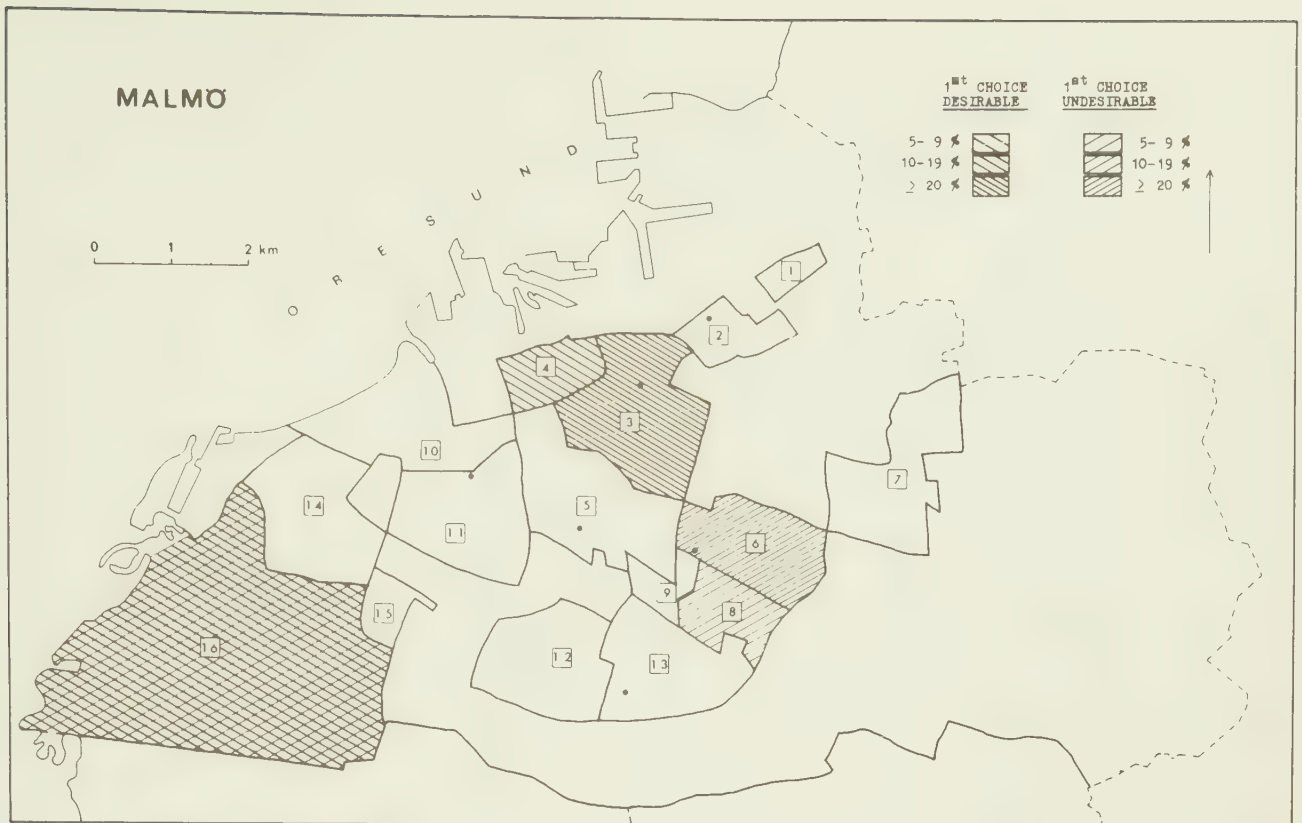


Fig. 37. Residential desirability for Rörshjögskola children
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 38. Residential desirability for adults in Rörshjögskola area
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

staden-Lorensborg area (11) and area 10 are desired by adults. Rosengård and Rosengårdsstaden, as above, are least desirable for school pupils and adults in the Rörsjö School district which is also very much composed of many SS1 and SS2 census tracts. Rörsjö School is located in a SS2 area.

The pupils in the Södervärn School (PS 3) and the adults in that area have their strongest desirability of residential area in the nearness of the school. The Södra Förstaden, Södervärn, Möllervången, and Sofielund area (5) is located just south of area (3) (see Figures 39 and 40). The Kulladal, Eriksfält, and Söderkulla area (12) and Limhamn are the next desirable for school children in the Södervärn School. The adults desire areas 10, 11, and 16 as next desirable class range but choose area 12 as undesirable. Again as in the first two schools, the pupils and adults choose Rosengård and Rosengårdsstaden as the least desired. Limhamn is undesired in the second class interval by the pupils. Area 5 also has a supply of SS1 and SS2 census tracts. Södervärn School is located in a SS1 area.

In the fourth school district, Kronborg School (PS4), located in the Pildammsstaden and Lorensborg area, the pupils and adults selected this area as the most desired residential area, while the pupils choose Gamla Staden and area (10) within the middle class interval (see Figures 41 and 42). Bellevue (14) and area 10 is chosen by adults in the lowest class interval of desirability, and area 4 is undesired. Children and adults in the Kronborg school district, similar to both groups in the above mentioned schools, choose Rosengård and Rosengårdsstaden as least desired residential areas. The adults select area 6 as highly undesirable and area 5 in the lowest class interval of undesirability. Area 10 has a small number of SS2 tracts, but Kronborg School is located in a P-zone area where the problem is basically social.

The school children in the Hermodsdal (PS 5) School district regard the Almhög, Nydala, and Hermodsdal area (13) as the most residential desirable together with Limhamn (see Figures 43 and 44). The Persborg and Augustenborg area (9) and Bellevue area get a position within the lowest percentage class interval as areas most desired in which to reside. The adults select area 13 as most desired, area 10 in the middle class, and areas 14 and 16 in the low-

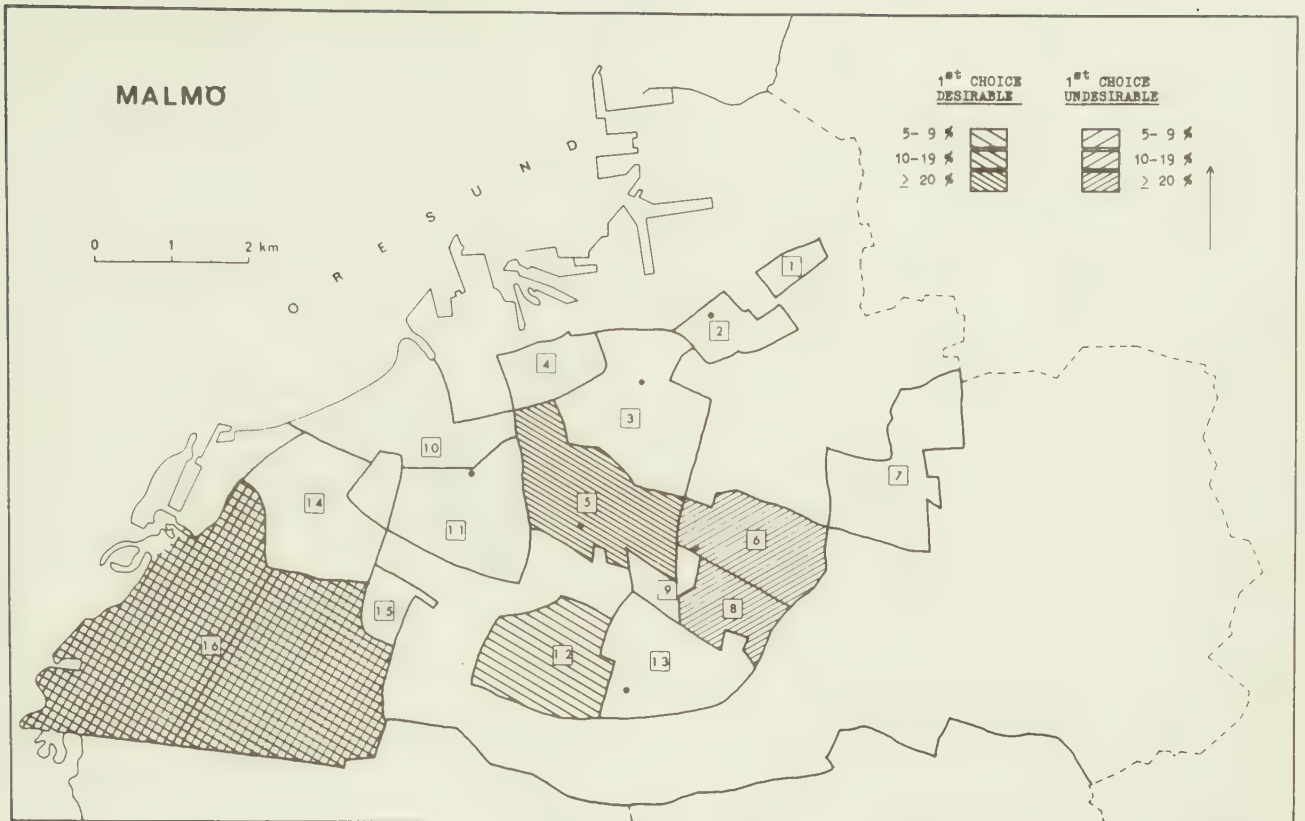


Fig. 39. Residential desirability for Södervärn School children
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

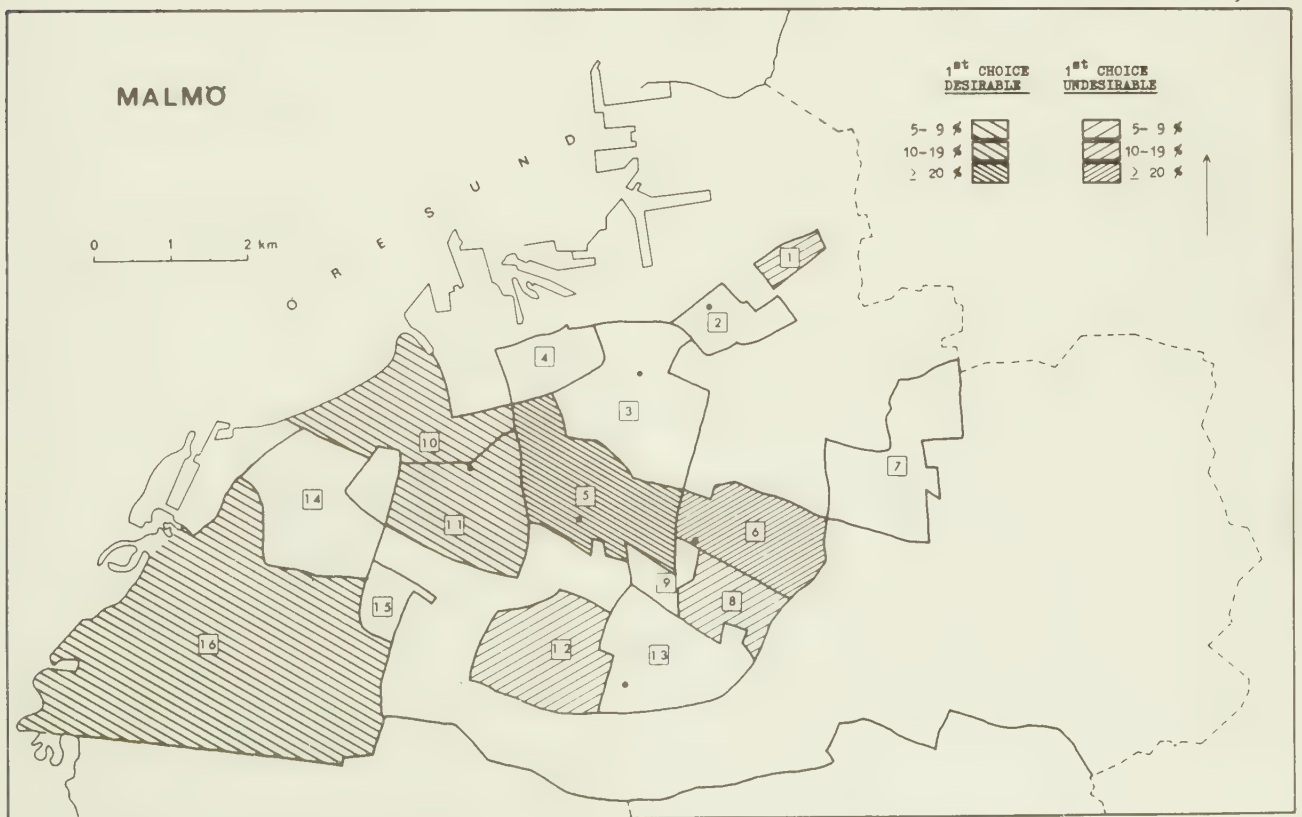


Fig. 40. Residential desirability for adults in Södervärn School area
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

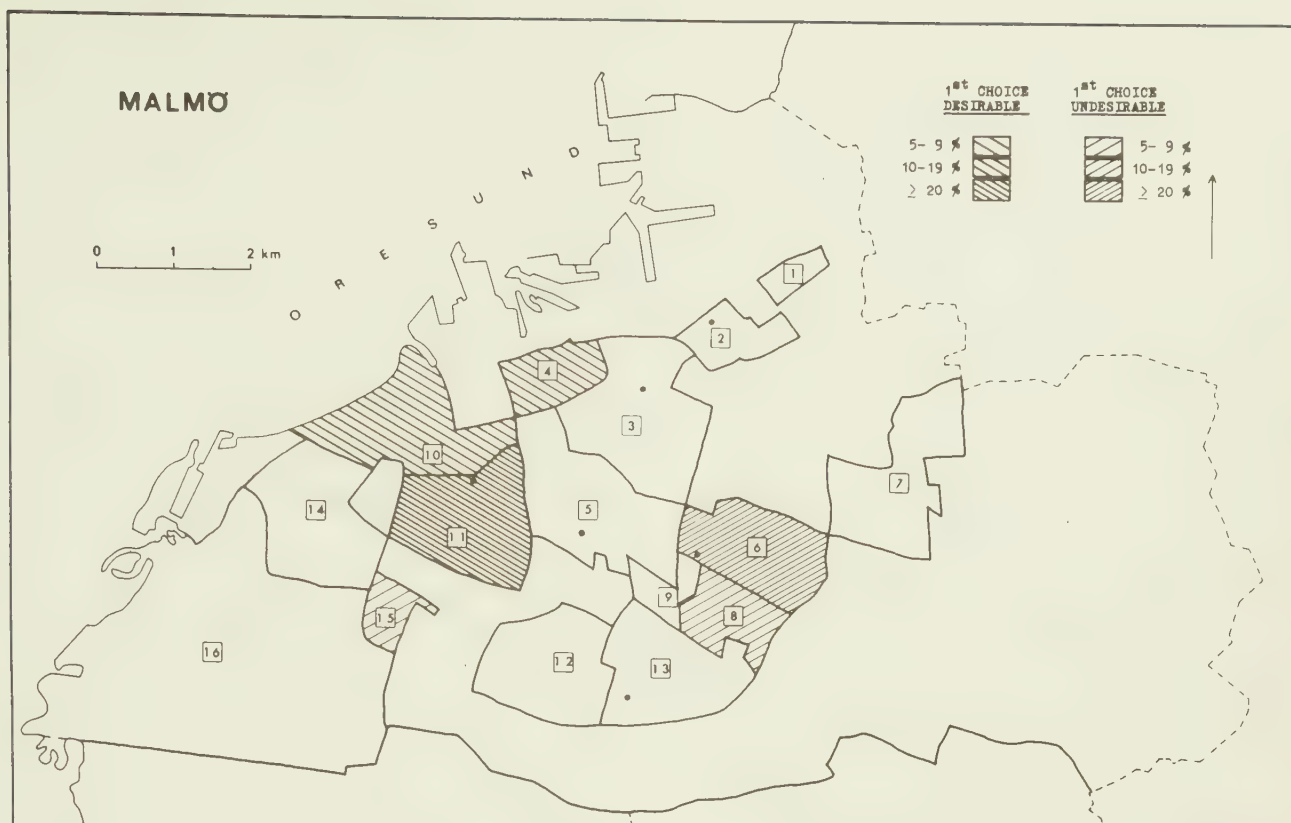


Fig. 41. Residential desirability for Kronborg School children
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 42. Residential desirability for adults in Kronborg School area
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

est class interval of desirability. As consistent as assumed, Rosengård and Rosengårdsstaden are first choices, among school children and adults in the Hermodsdal School district, as least desirable residential areas. Area 13 has only two SS2 census tracts. Hermodsdal School is also situated in a P-zone area.

The school children in the Värner Rydén School (PS 6) which is located in the Rosengård area desire that area and Gamla Staden as first choices of desirability, where as Limhamn falls in the middle class as first choice (see Figures 45 and 46). Limhamn combined with the Persborg and Augustenborg area (9) and Kroksbäck (15) are first choices as least desirable. Adults select Rosengård as most desired on one hand and least desired on the other. Areas 1, 4, 14, and 16 are chosen in the middle class range for desirability. Area 15 is also undesired according to the adults. Again, Värner Rydén School is located in a P-zone area, after 1965 data, which is not marked by physical deterioration, but the problems are basically social. The social effects can bring about a quicker physical decay.

The perception surfaces are, in this study, the areas in which the schools are located, and in all cases they received the highest first choice percentages. It is not necessarily accepted that the adjoining areas are first choices for the most desired or least desired residential areas. There are two distinct and similar trends about the first choices from five of the six school districts. The adults from all five of the six districts choose area 10 as desirable. Rosengård adults are the exception. The cause is probably the lack of information about the Slottsstaden-Fridhem area. Rosengård is an area composed of many young, newly arrived persons in the city with little knowledge about the city's physical structure.

The children and adults from these districts have perceived the Limhamn area as the area of desirability, outside their residing areas, in the highest and middle class intervals. PS4, which is close in distance to area 16, is the exception. The pupils and adults neither select the Limhamn area as desired or undesired. This perhaps depends on the familiarity and knowledge of the area by the participants of the survey. In three cases the Limhamn area is least desired as first choice. What phenomena make Limhamn so popular and sought after by many of the children but by the same

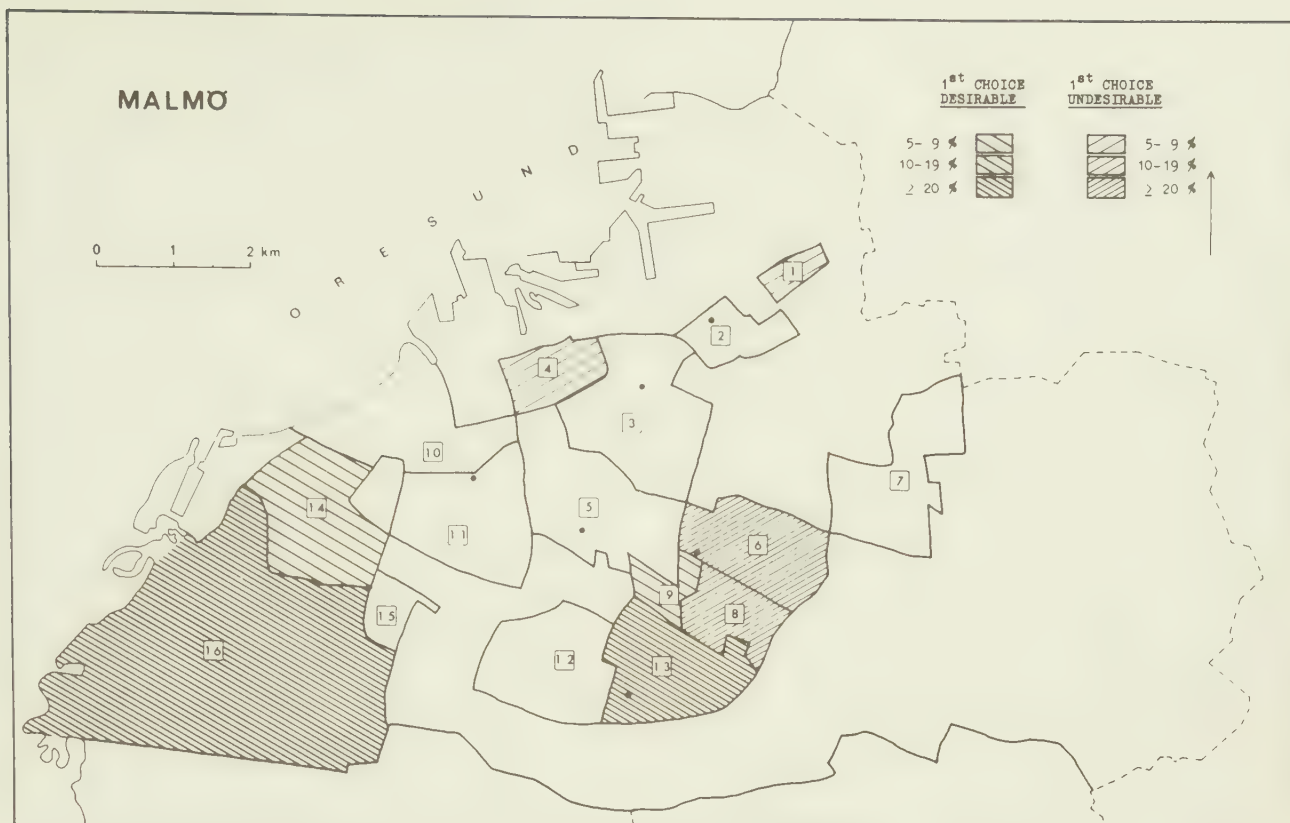


Fig. 43. Residential desirability for Hermodsdal School children
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 44. Residential desirability for adults in Hermodsdal School area
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

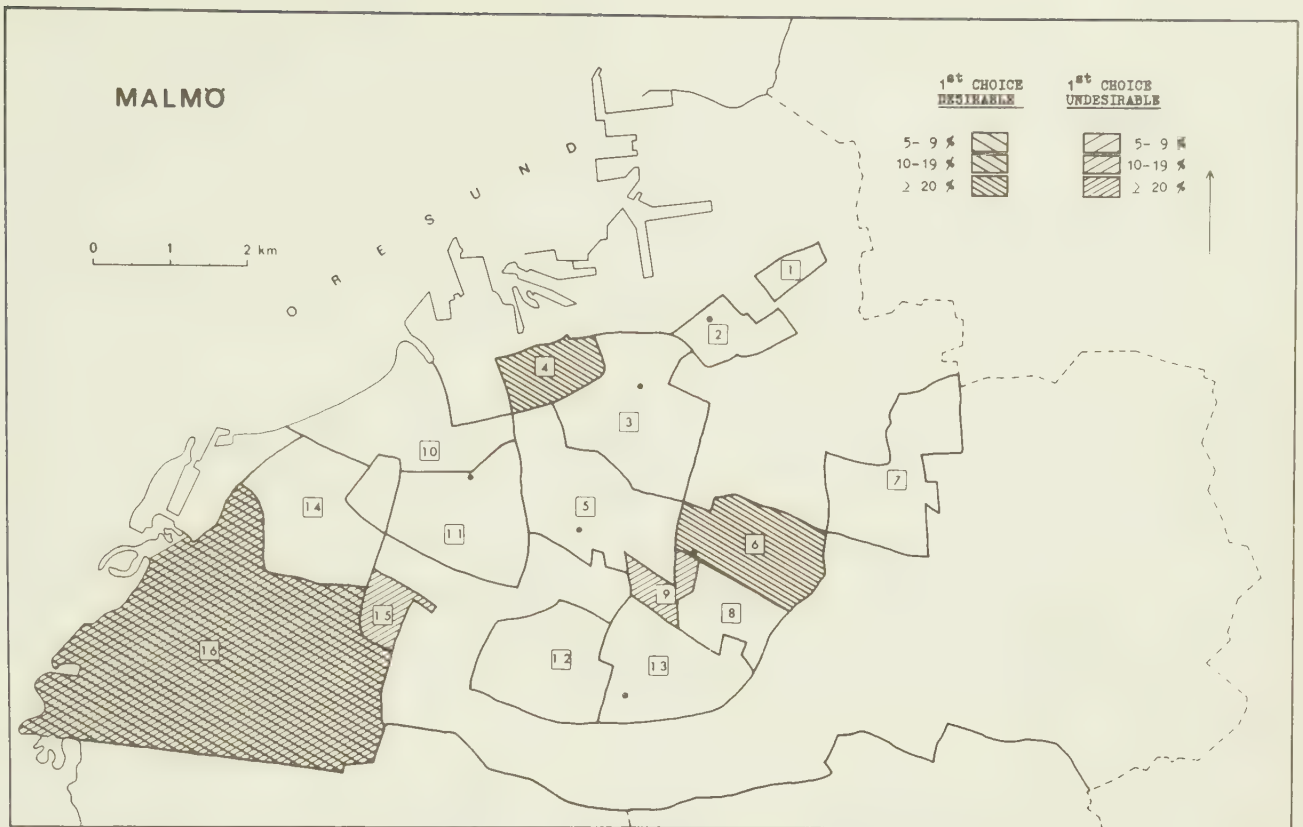


Fig. 45. Residential desirability for Värner Rydén School children
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)



Fig. 46. Residential desirability for adults in Värner Rydén School area
(Approved for distribution by Rikets Allmänna Kartverk. 1972.06.26.)

token least desired by an abundance of them? This question deserves further study. The local peak was dominant. Peter R. Gould comes to approximately the same conclusion in most of his mental map experimentations. It demonstrates clearly that individuals perceive the geographic space in which they live and desired most to reside in this perceived space because of the greater perceptual knowledge of it.

Allan Pred elucidates this in a more precise manner when he states, "The visual-information field of an individual, like his private information field, falls off in intensity quite rapidly with increases in distance, thereby making him highly dependent on those material phenomena which happen to be visible in the vicinity of his daily path of movement."³⁰ With increasing physical distance, person to person contacts of an individual's information field decrease.³¹

Regardless of the geographic distance from the perception surface, the Rosengård area was selected by most school children and adults in all but one school area, which is located in the Rosengård area, as the first least desirable residential area in Malmö. One could speculate and come to the conclusion that Rosengård is a victim of negative publicity from the mass media. The speculation is conceived because school children and many adults residing in this area have no qualms about selecting Rosengård as one of the most desired residential areas. The specific answer to why Rosengård is most desired by the children and adults who live there and who participated in the study and least desired by most of the remaining school children and adults in other schools and areas could be prospects for a behavior and attitude analysis for psychologists and sociologists, respectively.

The validity of such a perception surface study can be questioned because of induction of the mental image. The individual is presented with a stimulus and responds subconsciously to this stimulus, in this case a map. This procedure has a tendency to replace the original mental image. One can also question the method of selection of the six schools and sixteen areas. Nevertheless, some

³⁰Pred, op. cit., p. 33.

³¹Torsten Hägerstrand, Innovationsförloppet ur Korologisk Synpunkt, (Lund, Carl Bloms Boktryckeri, 1953), p. 237.

valuable and usable information may be obtained.

Another problem is the difficulty of determining how much information is transferred and gathered from person to person. "General images are clearly shaped by the varying flows of information to which people are subjected, but it seems an almost impossible task to specify such flows properly. Radio, television, newspapers, magazines, poster—all these, and many other media, contribute to the varying flows of information about the desirable and undesirable characteristics of areas in the United Kingdom."³² Tradition and sentiment for residential areas must be considered. In the case of Malmö, it is also assumed that mass media, parents, and school mates have played a decisive role in determining the undesirability of the Rosengård and the Rosengårdsstaden areas.

This investigation points out that regardless of what position in social space an area is situated, whether it is located in the SS1, SS2, P-zone, or in the high socioeconomic areas, is not the most essential point. The school children and adults tend to desire residential areas in which they live or in the surrounding areas. This perhaps depends on the visual-information field and/or personal contact within their information field.

In conclusion to this section about the background of residential differentiation, the importance that the local housing authority plays in this case, which was briefly mentioned under flow of information, should be more emphasized. Malmö and other Swedish cities with populations of one thousand or more (smaller cities with exception) have established local housing authorities (bostadsförmedling) to distribute the vacant apartments as justly as possible. There is no legal obligation for the property owners to notify the housing authority about the unoccupied dwellings. The communities generally contribute to house building with communal loans and grants for building-lots. As a result, the authorities have, to a great extent, utilized this for dictating terms for the obligation of the property owners to announce apartment vacancies. It is assumed that this has caused a low degree of social stratification segregation in Swedish cities because the local housing authority system has functioned considerably effective and without its equal in countries like the United States.

³²Gould and White, op. cit., p. 181.

CHAPTER VIII

CONCLUSION

The ultimate objectives of this study were to attempt to identify the internal residential structure of the City of Malmö and to apply a quantitative method to see if it was useful for mapping out the SSA. The utilization of the spatial models enabled one to more suitably study the spatial structure of Malmö.

It has been established after discovering the five basic factors where the different types of families were located over space and the relationship of these different types with the different socioeconomic groups. In this connection the populations and subpopulations of subareas can be microscopically examined.

The conclusion has also been derived that despite the shortcomings and problems involved with utilization of the quantitative method, factor analysis, it is the most practical and effective method of patterning many pieces of information or many unorganized variables in social area analysis or factorial ecology work. In addition to the earlier mentioned variables which are generally manipulated, social assistance and crime variables were placed into the analysis to see how these two variables would affect the results or with other negative parts of variables leading to what one would call substandard.

After interpreting the results of the factor analysis, it is adequate to say that Model 1: socioeconomic status and family status are necessary to show the distribution of subpopulations within the city's subareas. Without knowing the socioeconomic situation and the family or structure of the subpopulation, it would be entirely difficult to see social space in its perspective.

In Model 2, the postulate states that income, social assistance, crime, quality of dwellings, crowded households are measures which compose the socioeconomic status of subpopulations and tend to be associated with substandard areas. This hypothesis can be accepted for all the above measures except social assistance which was

below the city average of cases on the socioeconomic factor. There is a near resemblance between the measures above and the definition for SSA given in Chapter II.

In Model 3, age of population, age of dwellings, population of households are important measures in composing the family status of subpopulations, and they tend to be related to substandard areas. However, it was proven that ownership of housing has no effect upon family status.

In Model 4, zones one and two in Figure 31 are most identified with the Burgess model of Chicago. The families in zones one and two are small, but the number of members have a tendency to increase in the other zones. In Malmö, social stratification is found in sector form, and there tends to be a neighborhood effect in terms of socioeconomic groups. In relation to family status and socioeconomic status, Model 4 can be accepted.

Table 15 shows the percentage of each of the variables of each of the three stages of the SSA. It exemplifies a comparative image of the relative decline or increase for the SS1, SS2, and Potential zone stages.

Within the demographic characteristics, the per cent of population under the age of 16 years showed a continuous increase from SS1 to the Potential zone, but for the age group 60 years and above, SS1 and SS2 had a higher value. Consequently, more young families lived in the Potential zone, where as older families were settled in the SS1 and SS2 areas. The percentages for the below average annual income in Malmö for each of the SSA stages were extremely high. This can be defined as one of the most important indicators for determining if a census tract should qualify as one of the SSA characters. Under the occupational branches people who were employed within the manufacturing industries exhibited a decline from the SS1 to the Potential zone. The other branches of occupation (construction, commerce, transportation and communication, and civil service employment) remained relatively constant or on an equal plane. Women who were employed in the labor force over the age of 15 years had equally the same percentage for each of the three SSA stages.

It was obviously verified that the houses built before 1940 showed percentage wise a steady decline from the SS1 to the Potential zone. This meaning that the older houses as a rule were locat-

ed in the most blighted areas, specifically the SS1 stage. Then, there was a reversed pattern for the variable, housing built during 1940 and after. There were surprisingly many dwellings with in all three stages equipped with modern conveniences, but dwellings under this variable in the SS1 stage had the lowest percentage. Dwellings without modern equipment, in the lower range of quality, had the highest percentage in the SS1 stage and were greater in number than the second range of quality. This was the as-

TABLE 15
COMPARISON OF THE SSA STAGES FOR THE VARIABLES IN PER CENT

Variable Name	SS1	SS2	P-zone
2 % pop. under 16	14.9	16.9	17.9
3 % pop. over 60	20.7	21.4	16.5
5 Average annual inc. (below)	100.0	100.0	97.0
6 % manufacturing	40.8	35.4	31.3
7 % construction	10.3	10.2	10.7
8 % commerce	20.2	20.9	19.9
9 % transport. and commun.	9.1	8.8	8.3
10 % civil service	21.3	23.3	25.3
11 % women 16 and over in labor force	50.6	48.2	50.1
12 % housing built before 1940	60.9	55.6	44.1
13 % housing built 1940 and after	39.1	44.4	55.9
14 % dwellings with modern equip.	60.9	67.4	66.3
15 % dwellings without bath	9.0	9.9	9.3
16 % dwellings without modern equip.	29.8	22.6	24.4
17 % dwellings with 2 rooms or less	88.4	77.4	58.4
18 % dwellings with 5 rooms or more	0.7	2.8	5.0
19 % housing non-profit	5.3	11.9	21.3
20 % housing co-operative	38.2	31.0	22.7
21 % housing private	61.8	55.1	56.0
24 % overcrowded households	90.9	56.6	28.8
25 Over average with social ass.	100.0	71.7	33.3
26 Over average crime	90.9	81.1	30.3



sumption made that the lowest quality of houses was located in the SS1 area. The dwellings with two rooms or less had an extremely high per cent, and there was a sharp decline in per cent from the SS2 and Potential zone stages. The percentage of dwellings with five rooms or more was diametrically opposite those mentioned above. In the SS1 and SS2 stages, well over half of the dwellings was two rooms or less. In the Potential zone stage, 36.6 per cent of the dwellings was three to four rooms. There was an overwhelming different in percentage relativity between SS1, SS2, and the Potential zone stages under the variable overcrowded households, where 90 per cent of the SS1 areas had overcrowded households. In this entire paragraph about the occupied housing, the interpretation may be that the old houses with inadequate physical quality were small in size and overcrowded.

The percentages within the ownership of housing characteristics show that the non-profit housing increased from the SS1 to the Potential zone. The housing owned by co-operative organizations declined considerably from the SS1 stage to the Potential zone stage, and there was similarly the same picture for private housing. There were few non-profit houses but very many private houses in all three stages. It can possibly be stated that non-profit housing was more sufficiently cared for than the other categories of ownership.

Under the social characteristics, the areas in the SS1 were completely over the average with social assistance, with sharp declines in the SS2 and Potential zone stages. There was also a high rate of crime in the SS1 and SS2 areas, but there was an outrageous decline between the first two stages and the Potential zone stage. The social problems were greatest in the SS1 stage and seemed to decrease as the quality of stages increased (SS2 to P-zone).

Re-examining Table 15, it is evident that the variables (below average annual income, dwellings without modern equipment, overcrowded households, over average with social assistance, and over average crime) which had relatively high percentages in all three SSA stages are also synonymous to the terms given for the definition of the SSA, by the author, in Chapter II, where it is stated that the SSA elements are called low income, low quality dwellings, crime, social assistance, and high density of occupancy. The factor loadings in Table 10 can basically be interpreted in the same



fashion to give an identical result. The above resumé gives a more explicit explanation as to what is meant by SSA and how its three stages are compared in degree of percentage relativity. There were three perspective problems: the physical problems, the social problems, and a combination of both.

In the socio-geographical space as shown in Figure 18, the old central parts of Malmö City are remarkable SSA areas. These were parts of the city which were dominated by old houses built before 1920. In the Gamla Staden district where many of the houses built before 1920 were located, there were only some census tracts that were classified in the Potential zone stage; the other stages were not represented. Practically all of the census tracts in the Rör-sjöstaden district, Södra Förstaden district, and Möllevången district was mostly SS2 areas and some SS1 areas. In these older areas was found the very heart of the SSA problem, where there was a combination of social and physical problems. On the other hand, where predominantly all houses were built after 1950 (Persborg, Augustenborg, Nydala, Segevång), the problem was incredibly social and was classified under the SS2 stage.

The spatial image illuminated an agglomeration of old areas in the older central parts of the City of Malmö where the majority of the census tracts was classified under one of the three SSA stages and where the physical and social problems carried much weight but where outer and newer areas have also presented SSA problems, basically social.

The spatial aspect of residential differentiation was dissected into two parts: the classic ecological theories and the foundation for differentiation of residential areas. It was shown from the results of factor analysis that the concentric theory by Burgess best fits the family status of Malmö, where as Hoyt's sector theory is most suitable for describing the socioeconomic status of the city.

Finally, the roots of differentiated areas of residence were discussed. The economic and social components are the preference of residential locations, flow of information, family status, socioeconomic status, and residential desirability. In Malmö it is indicated that the city government and planning committees have much control over how the residential areas should be located with little influence by private individuals. The final objective depicts



social heterogeneous residential areas. The residential area desired by people in Malmö centers around the physical surface most often perceived, in this case, their original residence. The flow of information could possibly be strongest within the peer groups, which influences their desirability of residential areas. This is an assumption that has not been measured. Still most positive information about dwelling vacancies is distributed by the local housing authority.

One of the most essential reasons for the usage of factor analysis for studying the ecological structure is to make a periodical comparison with the same analysis to see if some changes have taken place and to see what those changes are and their ramifications. The ramifications and changes can lead to better provisions for future planning and development of the city or urban area.

Because Sweden is basically homogeneous in both the people and the structure of the three largest seaport towns, one can make an assumption that the results for the City of Malmö would be generally the same for Stockholm and Gothenburg.



APPENDIX A
COMPLETE OUTPUT (EXCEPT FACTOR SCORES)
FROM THE FACTOR ANALYSIS OF 1965 DATA

TABLE 16

FACTORIAL ECOLOGY OF CITY OF MALMÖ: 1965

FACTOR LOADINGS

Factor Number		1	2	3	4	5	
Eigenvalue		4.6	3.4	1.9	1.6	1.1	
Per cent of Total Variance (cumulative)		11.4	22.9	29.7	42.5	48.2	
No.	Name	Communality	Family Status	Socioeconomic Status	Housing	Young Familism	Blue Collar Employment
1	Population	.466	.135	.511	-.097	.408	.104
2	% pop. under 16	.509	.573	-.203	.041	.340	.153
3	% pop. over 60	.687	-.770	.063	-.158	-.183	.176
4	% pop. 16-44	.621	.767	.144	-.042	.041	.097
5	Average annual inc.	.341	.048	-.514	-.188	.183	-.072
6	% manufacturing	.319	.116	.290	-.050	-.087	.460
7	% construction	.056	-.108	-.069	.126	-.056	.143
8	% commerce	.274	-.099	-.021	-.428	.280	.041
9	% transport. and commun.	.241	.103	.104	.021	.198	.424
10	% civil service	.331	.101	-.065	.040	.182	-.531
11	% women 16 and over in labor force	.360	.441	.336	.032	-.053	-.222
12	% housing built before 1940	.807	-.559	.019	-.186	-.673	.075
13	% housing built 1940 and after	.386	.396	-.013	.106	.464	-.047
14	% dwellings with modern equip.	.861	.736	-.021	.464	-.301	.111
15	% dwellings without bath	.372	-.322	.275	-.002	.029	-.439
16	% dwellings without modern equip.	.743	-.665	-.066	-.443	.289	.125

TABLE 16--Continued

No.	Name	Communality	Family Status	Socioeconomic Status	Housing	Young Familism	Blue Collar Employment
17	% dwellings with 2 rooms or less	.676	-.168	.789	.044	-.065	.141
18	% dwellings with 5 rooms or more	.423	.094	-.584	.182	.069	-.188
19	% housing non-profit	.578	.146	.163	-.597	-.333	-.251
20	% housing co-operative	.540	.423	.497	.186	-.251	-.132
21	% housing private	.843	-.433	-.400	.464	.452	.275
22	% households 2 persons or less	.601	-.573	.397	.137	-.280	.133
23	% households 6 persons or more	.106	.124	-.179	-.149	.178	-.068
24	% overcrowded households	.466	.014	.658	-.007	.178	.023
25	Over average with social ass.	.474	-.249	-.219	-.309	-.464	.231
26	Over average crime	.461	-.014	.614	.149	.141	.205

APPENDIX B
FACTOR SCORES
FROM THE FACTOR ANALYSIS OF 1965 DATA

TABLE 17
FACTOR SCORES FOR CENSUS TRACTS

Census Tracts	I	II	Factors III	IV	V
013	-2.59	-.25	-.65	.63	-2.43
014	.48	.00	1.45	-.45	1.26
021	-1.46	-.68	-.97	.45	-.30
022	-.68	-.73	.02	.21	.86
024	-2.39	-1.38	.59	-.04	.43
025	-2.16	-.24	1.31	-2.10	-3.39
031	-.33	.26	-.78	-.09	-1.33
032	-2.37	.30	.38	.79	-1.18
033	.84	-.98	-.72	.73	-.02
041	.23	-1.54	.29	.77	-.22
100	.01	.37	-.73	-1.07	.13
101	-.52	.52	-.94	-.62	.34
110	-.63	.46	-.87	-.74	-.12
111	-1.81	-.29	-.73	.26	-.99
112	-1.11	-.87	-.79	-.21	-.69
120	-1.18	-.36	-.87	-.06	-.44
121	-.06	-.41	-.71	.71	-.63
130	-.52	-.08	-.71	-.86	-.05
131	-.14	.27	-1.04	-.34	.32
132	.08	.68	-.55	-1.41	.43
140	.05	.29	-.98	-.06	-.37
141	-.10	-.09	-.63	-.33	-.28
200	.01	-.47	-.65	.92	-.84
201	.41	.63	-1.21	1.03	-.69
202	.31	.42	-1.04	.87	-.59
203	-1.38	-.12	-.50	1.85	.12
204	-.45	.79	-1.15	.63	-.59
210	.01	.41	2.22	-1.49	.14
211	.39	-.26	2.32	.53	-3.61
220	-.22	1.16	-.92	1.07	-.46
221	.09	.39	.52	1.69	-.04
222	-.41	.70	-1.18	.02	-.19
223	.02	.76	-1.17	.71	-.74

TABLE 17—Continued

224	.28	.89	-.09	1.54	-.11
230	.31	.29	1.09	1.39	.37
231	.65	.39	1.22	.98	.07
232	.32	.75	.53	1.56	-.05
240	1.05	-.18	-.89	.79	-.72
241	-.90	-.35	2.59	.38	-1.36
242	-1.49	-.28	-.92	.56	-.72
243	-.93	.49	.29	1.28	-.07
244	.49	.31	-.49	.95	-.30
250	.24	.48	1.19	1.41	.24
251	-.18	.49	.52	1.72	-.07
252	.06	-.03	.24	1.52	-.60
253	-.26	-.82	2.11	.25	1.93
300	-1.00	-.51	-.66	-.29	.05
301	-.47	.09	-.62	-.34	-.37
302	.41	1.57	-.65	-1.99	.06
303	-.75	.66	-1.22	-.05	-.25
304	-.02	1.03	-.67	-1.59	.42
305	.31	1.47	-.42	-1.68	.05
310	-1.31	.15	2.31	-1.08	-1.29
311	-.39	1.10	-.60	-.75	.33
312	-2.04	.98	.21	.68	.85
320	.09	.78	-.90	-.93	.33
321	-.52	1.11	-.59	-.30	.24
330	.39	1.35	-.65	-1.39	.58
340	-1.13	1.15	-.67	.05	.24
350	-.37	1.29	.08	-.89	.26
351	-2.08	.70	-.45	.74	-.13
352	-1.59	-1.31	2.89	.01	1.97
360	-1.52	.92	-.53	.45	.74
361	-.28	1.22	-.66	.21	-.32
362	-2.27	1.39	.09	.73	.81
363	-2.84	.78	1.26	.81	1.95
364	-1.43	1.47	-1.00	.50	-.22
370	-.31	.65	.52	-.32	.16
371	.01	1.39	-.84	-1.17	.19

TABLE 17—Continued

372	-.81	.67	.63	.87	.41
373	-1.18	1.48	-.35	.09	.10
374	.49	1.42	-.96	-1.53	.04
380	.28	1.47	-.69	-1.59	.04
381	.42	2.04	-.69	-1.65	.57
382	-.95	1.40	-.74	-.21	.10
383	-1.45	1.55	-.94	.46	-.05
384	.71	2.23	-.94	-1.89	.39
385	-.03	1.43	-.53	.39	.43
390	1.70	1.35	-1.12	-.89	-2.92
391	-1.32	.93	-.27	.68	-.31
392	-.81	1.62	-1.02	.13	-.26
400	-.63	1.14	-.10	.67	.31
401	-1.00	.41	-.12	.53	-.06
402	-.31	.04	-.27	-1.38	.16
403	.02	1.69	.18	.18	.29
410	-1.44	1.70	-.82	.54	.21
411	-.71	1.51	-.59	-.56	.52
412	-.29	.68	-.02	-1.45	.69
420	.21	1.41	.34	1.66	.03
421	.94	.41	1.81	.83	.04
422	1.77	.35	2.24	-1.01	.24
423	-1.18	1.35	.95	1.11	1.41
424	.61	.22	.76	.69	-.11
425	1.24	1.26	1.28	.97	.05
430	-.08	1.65	.01	1.47	.15
431	-.08	1.04	1.28	1.08	.56
432	.75	1.37	.24	1.61	.29
440	.02	-.68	-1.35	.02	-.28
441	-2.09	-1.64	1.69	.62	1.21
442	.83	.28	1.36	1.14	.14
450	-1.53	1.07	.30	1.34	-.09
460	-1.95	-.07	.81	.24	.90
462	-.67	-1.20	.36	.41	.45
463	.65	.41	.61	1.51	.15
464	-.14	-.08	-.40	-.63	.23

TABLE 17—Continued

465	-.42	-.45	3.03	.62	-3.80
470	.97	-.36	.01	.29	-2.43
471	-.67	-.37	-.15	-.61	.71
472	-.67	-.30	-.51	-.19	.34
473	-.24	-.14	-.29	-.15	-.32
481	.33	.10	2.98	-.94	3.44
482	.55	1.74	-.02	-.25	.59
483	.19	1.14	2.09	-1.66	.85
484	.94	1.21	.02	.59	.76
490	-.92	1.04	.98	.60	.60
491	.46	1.19	-.25	-1.33	.35
492	.59	1.57	-.16	.53	.29
493	-.09	1.11	-.47	.77	-.26
494	-.46	-.33	-.64	-.24	.10
495	.76	1.33	.37	1.19	.56
500	.22	-.07	.94	1.54	.60
501	.31	.44	2.25	.69	.90
502	-.09	-1.34	-.66	.27	-.19
510	-.55	-1.11	-.72	.16	.12
511	-.59	-1.79	-1.09	.56	-.34
512	.79	-1.41	-.78	.78	-.30
513	-.27	-.55	.46	1.84	-.57
514	.16	-1.81	-.83	.62	-.22
515	-.04	-1.81	-.94	.51	-.19
516	.34	-1.36	.48	1.47	-.01
520	-.28	-1.48	-.81	.29	-.01
530	-.26	-1.25	-.62	.37	.31
531	.49	-1.37	-.52	.43	.19
532	-.37	-.87	-.44	.44	.36
533	1.08	-1.15	-.62	.68	-.18
534	.51	-1.43	-.68	.62	-.23
535	.89	-1.34	-.62	.53	-.14
536	.94	-1.32	-.66	.58	.06
537	1.21	-1.89	-.70	.92	-.07
540	.71	-1.26	-.59	.46	.10
542	1.42	-1.47	-.58	.73	-.06

TABLE 17—Continued

543	.57	-.94	-.41	-.15	.29
544	-.75	-.98	.09	-1.03	.84
545	-1.09	-.48	-.16	-1.62	.49
546	.25	-.27	-.23	-1.84	.64
547	.32	-.74	-.01	-1.08	1.32
548	1.16	-.58	-.43	-2.35	-.91
549	2.15	-1.04	1.24	-.77	.11
552	1.10	-.24	-.85	-.55	.05
553	-.04	.50	.11	-1.44	.74
560	.02	.47	.01	-1.41	.79
561	-.24	-.02	-.31	-1.00	.27
562	.87	.11	.50	.89	-.12
563	.39	.54	-.38	.88	.13
564	-.04	-1.23	-.44	.03	-.07
565	.35	-.81	-.51	-.08	-.08
566	1.26	-.97	-.63	.56	.01
567	-.23	-.65	-.43	-.64	.64
570	.91	-.94	-1.05	-1.15	-.37
571	-.28	.32	-.32	-1.11	.49
572	-.28	.21	-.22	-.98	.56
573	-.30	1.11	-.29	-.47	1.33
574	-.14	.01	-.27	-.95	.29
575	.37	1.01	-.33	.26	.38
576	.78	1.71	.15	1.03	.63
577	-.40	-.61	-.75	-.05	.26
580	-.64	.53	.02	.24	.22
581	-.07	-.12	-.27	-1.07	.50
582	.43	-.15	-.06	.79	.03
590	2.73	-.68	.08	-1.94	-.62
591	1.19	1.12	-.55	.84	.37
592	-.87	-.53	-.36	-.59	.47
600	.93	-.17	-.74	.81	-.22
601	.26	-1.46	-.92	.31	-.25
602	-1.26	-.58	-.63	.08	.26
603	.76	-1.55	.71	1.67	-.17
610	.44	-1.56	-.46	.46	-.03

TABLE 17—Continued

620	.83	.18	1.36	1.17	-.01
621	.76	.69	.78	1.54	.20
630	.57	.04	.26	1.61	-.08
631	2.14	.01	1.87	-1.17	-.25
632	-1.45	1.29	.43	1.89	-.29
641	2.57	-.07	1.61	-1.22	1.69
642	-1.09	.49	-.59	-.18	-2.19
650	.96	.62	1.75	-1.19	-1.77
652	.54	.24	.57	1.59	.28
653	-.13	-.49	-.19	-1.50	.33
654	.31	.69	-.49	-.49	.59
660	-1.09	-1.00	-.69	.16	.11
670	-2.29	.18	.34	-1.65	.37
671	-.46	-.41	-.42	-.57	.19
672	-.02	-.61	-.39	-.55	.21
673	1.31	.36	.73	1.04	.14
674	-.34	-.44	.23	-1.13	1.04
691	-1.08	-.68	.48	-.35	-1.92
692	-.42	-.54	-.12	-1.64	-.01
700	.53	.64	-.25	-.89	.29
701	.85	.56	-1.06	.59	-.26
702	.64	-.78	2.36	.75	-2.73
710	-.09	-.37	-.57	-.93	.46
711	.11	-.69	-.48	.06	-.11
712	-.07	-.51	-.18	-1.14	.71
713	.94	-1.60	-.57	.65	-.41
720	-.53	-1.54	-.19	-.86	2.16
721	.94	.72	.09	1.72	.23
722	1.10	.12	.63	1.34	-.08
723	-.01	-.69	-.37	.38	.40
724	-2.21	-.27	.24	-1.55	.46
730	1.17	1.35	.14	1.49	.31
731	1.53	.65	-1.40	.69	-.07
740	-.25	-.01	.21	.22	.50
741	1.44	.94	-1.16	.82	-.04
750	-.07	-.59	-.44	-.08	.07

TABLE 17—Continued

751	-.24	-.55	-.37	-.64	.23
752	-.37	-.30	-.45	-.35	-2.11
753	1.09	.26	1.62	1.03	.08
760	-.06	-.84	-.38	-.39	-.13
761	1.51	-.30	1.29	.35	-3.82
770	.83	-.87	-.58	-.73	.10
771	.47	-.21	-.01	-1.07	-.55
780	.44	-.80	-.48	-.13	.21
781	-.24	-.57	-.46	-1.00	.19
790	.30	-.22	.11	-1.28	-.08
800	1.33	.45	1.43	1.04	.21
806	-.16	-1.09	2.19	-.14	1.24
810	1.03	1.19	1.56	.99	.31
811	.59	.79	.58	1.53	.34
812	-.31	-.24	-.71	.16	.06
813	.81	.50	.65	1.45	.51
814	-.23	-.63	-.33	-.44	.68
815	-.70	-.49	.99	.67	1.05
816	-.59	-1.13	-.37	.03	.18
820	1.09	1.46	.35	1.49	.28
821	-.31	-.37	1.65	-.02	-2.69
822	1.07	-.40	-.28	.17	.62
823	2.99	1.56	1.34	-2.21	-.38
824	1.59	1.32	-.42	-.86	-1.98
830	1.24	-.10	2.22	-1.33	1.57
831	-.21	-.75	-.33	-.35	.63
840	-.54	-1.51	2.24	-.40	.14
841	.57	-.78	-.36	-.16	.48
842	1.33	-1.65	-.74	.85	.14
843	1.08	-1.09	-.39	1.05	.22
844	-.16	-.64	-.41	-.48	.43
845	1.39	-1.16	-.66	.76	.09
846	-.04	-.54	.01	-1.34	.38
850	1.25	-1.24	-.51	.58	.06
851	.43	-.80	-.55	-.11	.41
852	.82	-1.31	-.39	.85	.53

TABLE 17--Continued

853	-.39	-.54	-.24	-1.39	.03
854	1.29	-.95	-.43	1.01	.05
855	.41	.03	-.49	-.46	.66
856	.05	-.62	-.43	-.16	.38
857	1.09	-.96	-.51	.24	-.13
858	-2.04	-.52	3.42	-1.56	-.53
859	1.28	.48	-.16	-.40	.62
860	.67	-.69	-.50	-.01	.23
861	-.35	-.62	-.25	-.82	.33
862	.03	-.48	-.39	-.60	.46
863	-.62	-.49	-.59	-.22	-.98
864	-.43	-.51	-.36	-1.18	.11
865	-.25	-.87	-.19	-.72	-1.02
866	.89	-.89	-.58	.49	-.19
870	.32	-.40	.57	-1.09	.96
871	-.59	.25	2.19	-2.19	-3.08
872	1.32	-.39	-.78	.56	-1.03
873	-.29	-.21	2.91	-2.07	-1.93
874	-1.18	-1.72	-1.10	-1.57	-.57
875	-.46	-.09	-.24	-1.85	-.17
876	-.98	-1.18	-.78	-.49	-.74
877	.10	-.62	.04	-1.18	-.03
880	-.06	-.12	-.03	-1.03	.03

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